SOUTHERN POWER AND INDUSTRY

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AUGUST, 1952

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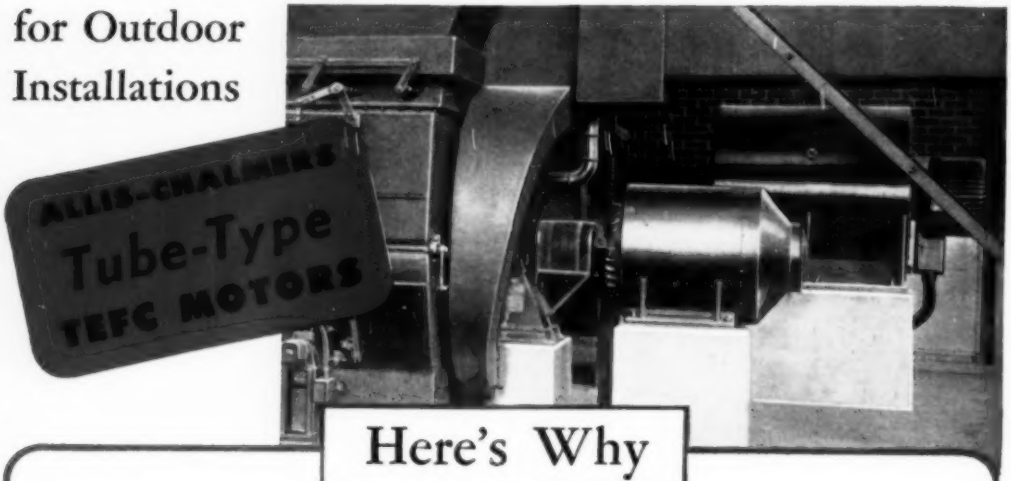
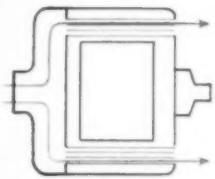
Your *Best* Motor Buy

for Outdoor Installations



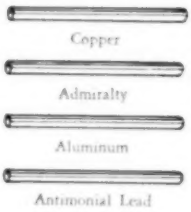
Here's Why

Practically Self-Cleaning



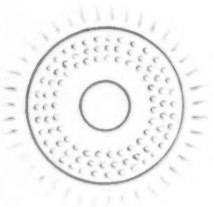
Air-to-air heat exchanger has straight, smooth tubes with no pockets in which dirt or moisture can collect. Velocity of cooling air through the tubes keeps surfaces swept clean. If sticky dirt should pile up, the tubes can be cleaned in a few seconds with a long handled brush.

Choice of Tube Materials



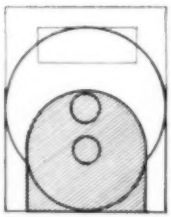
Allis-Chalmers tube-type motors can be built for service in corrosive atmospheres and for outdoor operation in almost any climate. Tubes may be made of a variety of materials, depending on service conditions.

Uniform Cooling



Tubes for carrying cooling air are distributed uniformly around the perimeter of the stator and along its full length. Result: heat travels over a short path and the interior is uniformly cooled.

Compact



Allis-Chalmers tube-type motors are little or no larger than open motors of the same rating. Tube-type design exposes large surface area to cooling air in minimum space.

Get Complete Information Now — Ask your Allis-Chalmers district office representative about tube-type, totally-enclosed fan-cooled motors in sizes up to 2000 hp. Or write Allis-Chalmers, Milwaukee 1, Wis., and ask for Bulletin 51B7150.

A-3767

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Volume 70 Number 8

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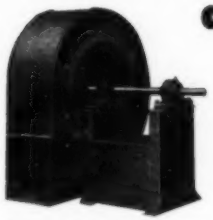

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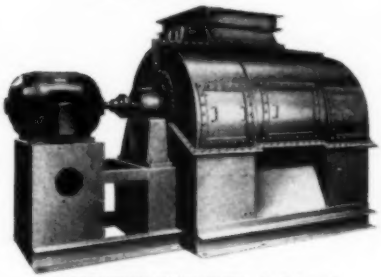

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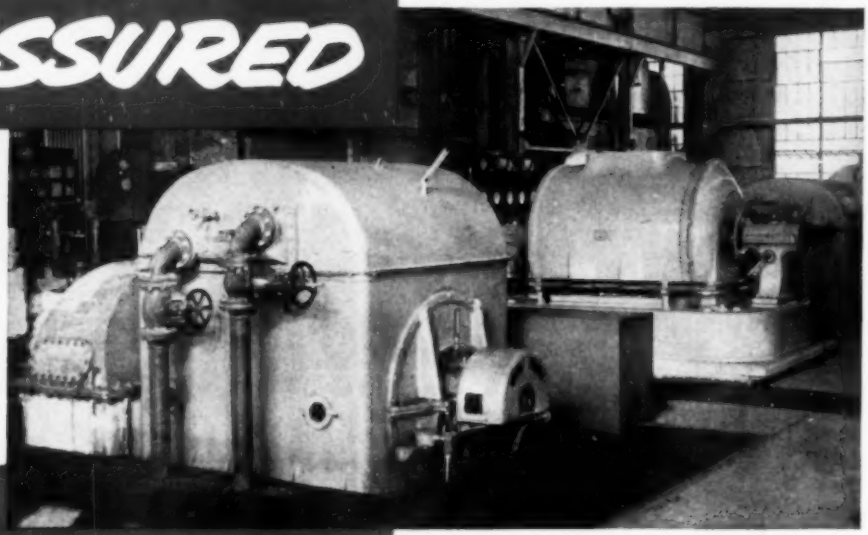

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SOUTHERN POWER AND INDUSTRY

AUGUST 1952

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Facts and Trends

FOR SOUTHERN INDUSTRIAL AND POWER EXECUTIVES

August, 1952

► OKLAHOMA'S FIRST PAPER MILL -- the Pryor, Oklahoma, operation of the National Gypsum Company -- is probably the first paper mill ever constructed WITHOUT A BUILT-IN POWER PLANT. All electric power, water, steam, sprinkler water, and compressed air is piped in.

During World War II, the government built the Oklahoma Ordnance Works, a 51 million dollar smokeless powder plant near the Grand River, eight miles south of Pryor, Oklahoma. As tremendous amounts of steam and hot water were needed to wash the chemicals free of acid, a steam-electric plant was constructed. After the war the Grand River Dam Authority advertised that it would be willing to sell steam, electricity, water and compressed air to any industry which would locate in northeastern Oklahoma. National Gypsum constructed their modern mill which converts waste paper into a bonded eight-layer sheet used for lining gypsum board lath and sheathing.

Over 5 miles of steel, copper, concrete and lead pipes carry water, steam, and compressed air to the various operating sections of the mill. Primary power is 13,200 volts, 3 phase, 60 cycle. Secondary power is 460 volts. Water is filtered, treated and chlorinated and delivered to the plant through a 12 in. line at 75 lb pressure; compressed air delivered through a 4 in. overhead line; and steam through approximately one third of a mile of overhead 12 in. pipe at 150 lb pressure. Condensate is not returned but is used with fresh or clarified water for felt showers.

► CHECK ON "SQUIRT" WELDING -- yesterday's novelty but today's tool. In this issue, Paul Broadstone, Production Engineering Supervisor of the R. G. LeTourneau plant at Longview, Texas, reports on the plant tested production technique. Process combines the flexibility of hand operation with the smoother, cleaner welds produced by hidden welding processes. Average savings in this Texas plant have been more than 30 per cent over former hand welding techniques.

Spatter is minimized, it is not necessary to wear conventional type welding helmets, air is free of smoke and arc rays, and high amperages are usable. Basic equipment, process details and other production benefits are featured in this issue of SP&I.

► PRODUCTION OF ELECTRIC POWER from atomic reactors is perhaps four or five years away, measured in terms of full-scale producing units, according to Monsanto Chemical Company officials. After a year of intensive study, a scientific team from Monsanto and the Union Electric Company of St. Louis, has recommended the design and construction of a pilot plant for a moderated type of atomic reactor. The team, under contract with the A.E.C., feels that there is NO PRESENT POSSIBILITY of constructing a reactor that would PRODUCE ONLY POWER. The MANUFACTURE OF PLUTONIUM as a co-product IS A NECESSITY at present, but this fits into the government's pressing need for plutonium.

The companies have recommended that the A.E.C. construct and own the pilot plant until the question is decided whether the present law prohibits private ownership of facilities. At the same time Monsanto and Union Electric would continue their investments in the team which would have a full share of responsibility in the design, construction and operation of the pilot plant. When the legal problems on ownership of reactors can be adjusted, the team believes that private industry will invest its own funds in the construction and operation of a full-scale plant for the production of power and fissionable materials.

(Continued on page 6)

for VELVET SMOOTH ACCELERATION

use these Allen-Bradley Starters with Graphite Compression Resistors

Cutaway view of Allen-Bradley graphite resistor tube showing discs, insulating lining, and the pressure terminal.

With these Allen-Bradley compression resistance starters you can start squirrel cage motors with such velvet smoothness that there is no voltage dip . . . no lamp flicker. The secret of this stepless acceleration lies in the smooth control of the Allen-Bradley graphite compression resistors which are shown below.

BULLETIN 640 MANUAL
Stepless Resistance Starter

The motor current passes through the graphite disc resistors. Compressing them with the hand lever reduces the starting resistance steplessly until it is shunted out automatically.

BULLETINS 740 & 741 AUTOMATIC
2 and 3 Step Resistance Starters

In these two resistance starters, the adjustable resistors are arranged in 2 or 3 steps. Each step is cut out, successively, by timing relays. Adjusted for equal current inrush per step.

BULLETIN 742 AUTOMATIC
Stepless Resistance Starter

In this starter, compression of the graphite discs is done automatically by a solenoid mechanism. Velvet smooth acceleration is obtained. No other starters provide similar stepless control.

Bulletin 640 Starters have a hand lever for manually compressing the resistors. At maximum speed position, a magnetic contactor automatically connects the motor to full voltage.

Bulletin 740-741 Starters are rugged, automatic starters.

Bulletin 742 Resistance Starters prevent lamp flicker on network systems. They provide automatic stepless starting for machines and processes which are easily damaged by sudden starting.

BULLETIN 646 TRANSFORMER-TYPE STARTER

For loads with high starting friction, requiring sudden applications of power, use the Bulletin 646 Manual or the Bulletin 746 Automatic Transformer-type Starters.

Write for Bulletins to Allen-Bradley Co., 1328 S. Second St., Milwaukee 4, Wisconsin

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SAN ANTONIO—Wilson Elect. Equip. Co., P. O. Box 5121, 101 E. Maple St., Circle 4-1471
SAN DIEGO—James A. Setchell, 301 W. "G" St., Tel: Franklin 3981
TULSA—John W. Elder, 1341 S. Boston, Tel: 3-0950

► UNION MEMBERSHIP RATIO DECREASING — According to the National Chamber of Commerce Washington Report, 9,000,000 have joined the labor force in the last decade. But organized union membership has increased only 300,000, or one-thirtieth as much, in the same period of time.

► POWER FACTOR probably creates more general confusion in power and industrial plants than any other term. A working knowledge of the phrase and its usage is essential for the plant man who wants to advance toward full responsibility for maintenance and operation of electrical equipment. We invite Southern and Southwestern plant personnel to study a discussion of the subject in this issue of SP&I. Much of the mystery and confusion caused by power factor will vanish into thin air. The current discussion deals with definitions and mathematics. The September installment will help the plant man apply this knowledge to everyday plant problems.

► TIMESTUDY-INCENTIVE is a combination that measures capability and rewards performance. Check the Industry Speaks page of this issue for brief comments on this subject by a noted consulting engineer. He emphasizes that planning and producing is the major task of management. For sound planning you need facts. Timestudy can supply the measure of the task to be performed.

To make plans and issue instructions is only the start. Someone must carry through, and incentives can control performance. To continue successful operations you must have capable people. You must develop people who are willing and able to work as a team for the success of your concern. Timestudy-incentive is a combination that will do the job.

► AN "AMPHIBIOUS" PLANT, including a central power system capable of supplying 2,000,000 gallons of superheated water daily, is being constructed by the Freeport Sulphur Company for mining the company's extensive Bay Ste. Elaine sulphur deposits. Having a capacity of 500,000 long tons of sulphur a year, it is the biggest single sulphur development anywhere in the world in two decades. Operation is scheduled for late '53.

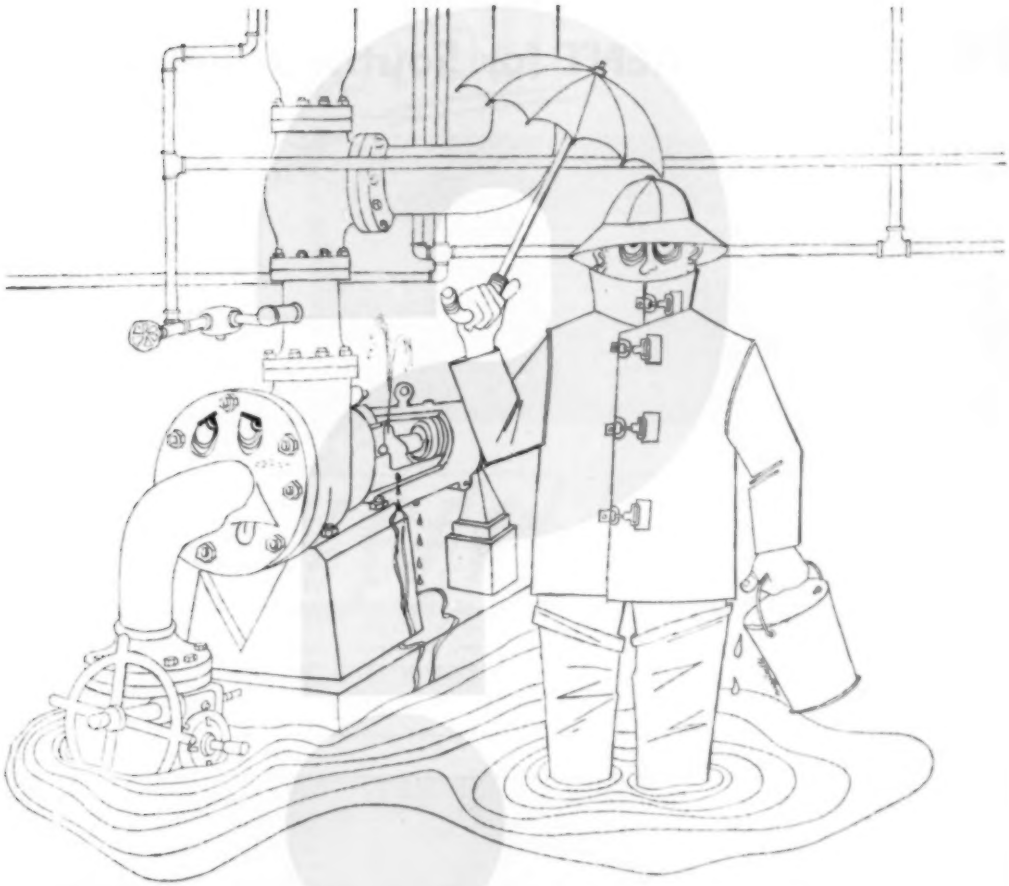
Freeport Sulphur is also installing a microwave radio communication network to link remote industrial operations with New Orleans headquarters. Network will span an area of 500 square miles. Cost of the system is approximately half that of constructing telephone lines under normal conditions, and maintenance will be negligible because there will be no poles or wires to blow down in storms. The only access to most of the mining operations is by water.

► GAS TURBINES are proving to be an economical and efficient source of power for gas pipeline pumping. Two gas pipelines, one powered by reciprocating engines and the other by gas turbines were recently studied and compared in a survey by Westinghouse. A 26 in. pipeline powered with gas turbines was found to deliver the same amount of gas more economically than a 30 in. line powered with conventional reciprocating engines.

Unlike the reciprocating engines, the gas turbine lends itself to driving a high speed centrifugal compressor for gas compression. The latter operates more efficiently at lower pressures than a reciprocating type compressor, permitting closer station spacings. As a result, the annual delivery capacity for a gas turbine powered line is substantially greater.

The first experimental gas turbine for land application, built by Westinghouse, was installed in 1949 at Wilmar, Arkansas, on the Mississippi River Fuel Corporation's gas line. Considerable operating characteristics and information on the turbine and its adaptability to gas line pumping was secured. Unit was purchased early this year by Mississippi River Fuel Corporation and is now in permanent operation.

Write the editors for additional information on any of the above items.
SOUTHERN POWER & INDUSTRY 806 Peachtree St., N.E. Atlanta 5, Ga.



*Who needs a mechanical seal?**

If you've got hip boots, a bucket and a standby maintenance crew with nothing to do, why bother with a BJ Mechanical Seal? Take a devil-may-care, every-pump-for-itself attitude and let the packing fall where it may. Or if your maintenance department enjoys a "Quick-save-the-dikes" sort of life, they will have great fun poking in packing before the stuff completely goes.

BUT . . . if your business allows little room for exciting crises and repacking picnics, you should know about the BJ Mechanical Seal. This excellent, precision-made seal – available in a number of engineered types – takes the trouble right out of any stuffingbox. There's no leakage . . . no waste . . . no contamination of pumped liquid . . . no volatile liquid hazard . . . no profit-robbing repacking and delivery-delaying downtime.

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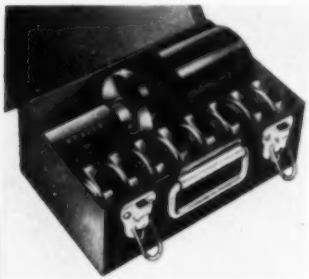
NEW EQUIPMENT for Southern Industry

Universal Nipple Chuck

J-1

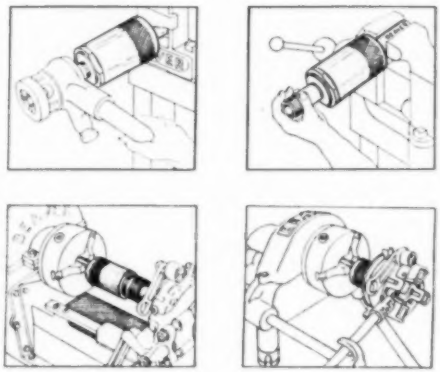
BEAVER PIPE TOOLS, INC., 310 Dana St., N.E., Warren, Ohio, recently introduced to the market a universal nipple chuck (Beaver "55") capable of threading ⅛-inch to 2-inch pipe.



Beaver Pipe Tool's universal nipple chuck can be used with pipe machines, power drives or bench vises. Available with a full range of adapters.

This new universal nipple chuck has but three parts . . . a polished steel body, a sliding plunger and a hardened steel threaded shank. Nipples are easily removed by hand . . . no wrenches required.

Adapters allow for all sizes from ⅛-inch to 1½-inch pipe. No adapter is needed for 2-inch pipe. An inserted pin retains the sliding plunger in working position.



As illustrated in the top sketches, *Beaver Pipe Tool's* universal nipple chuck can be used with any make of pipe vise or with a machinist's vise. Note in the lower sketch that it can be used with any make of pipe machine. With a power drive and a Beaver 77 threader, you can cut any size of nipple, including "all thread".

Usable four ways . . . with a pipe machine, a power drive, any pipe vise or a machinist's vise, the tool soon pays for itself by converting short lengths of pipe into useful all-thread, close-thread or average nipples. Optional for the buyer is a heavy gauge sheet metal kit box for carrying chuck and a full range of adapters.

Portable Parallel Unit for Machine Shop Operations

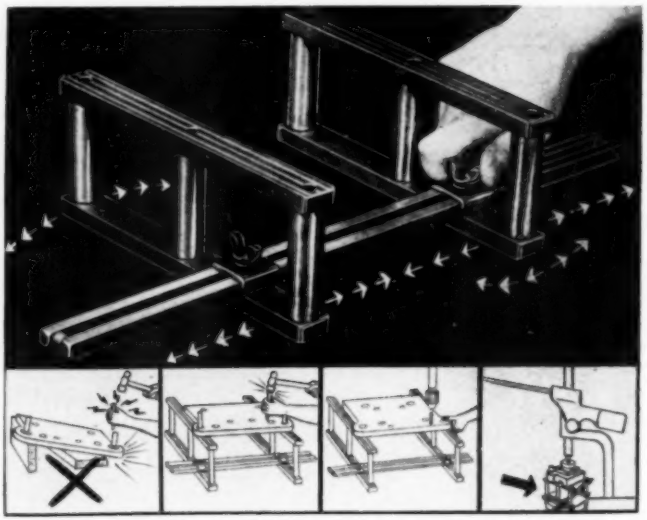
J-2

ACRO SAFETY PARALLEL DIVISION, 24 S. Crawford Ave., Chicago 24, Ill., announces the Acro Die Cradle, an adjustable, portable, safety parallel unit which is designed to reduce shop accidents by eliminating haphazard methods of supporting dies, jigs, and other equipment during drilling, counterboring, tapping, milling or grinding operations.

The device is made of high grade steel, hardened and ground to close tolerances to assure accuracy. It consists of two parallel units each 4 in. in height, 9⅞ in. long, in the form of a frame, with center and end posts 1 in. in diameter supporting top and bottom bars; and an adjusting rail which joins the two parallel units together. Versatility of adjustment is possible by pivoting these parallel units so that either the front or rear ends point inward or outward, at practically any required angle.

In use, the die cradle is set up on the work bench, drill press or wherever needed and the parallels adjusted to the desired spread for accommodating the die set, jig or other items to be worked on. Because of the height of the parallels, there is ample clearance for die guide posts or for underneath finger manipulations. Thus the

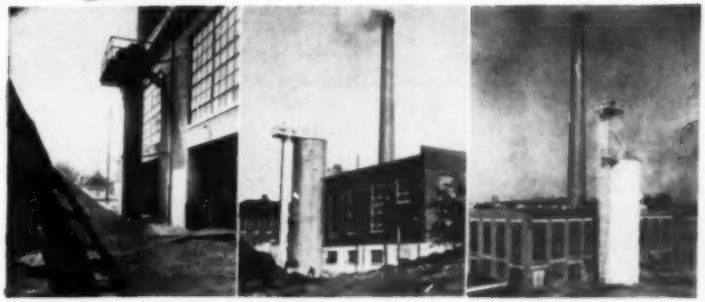
(*Continued on page* 10)



The *Acro Die Cradle* (4 in., heavy duty, center post model illustrated) speeds up experimental drilling, tapping, bench die and fixture assembly work.

From the small

POWER PLANTS



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device prevents toppling over of dies, and other dangerous shifting of work.

The unit is available in stock parallel heights of 3, 4, 5, 6, and 7 in., with adjustment spreads up to 18 in., with or without center posts.

Free additional information is available to readers of Southern Power & Industry. Check item number on the postage free service coupon post card—page 17.

Reversible Seat Boiler Gauge Cocks

J-3 THE INFERNO COMPANY, Box 1138, Shreveport, Louisiana, manufacturers of safety valves, oil and gas burners, and other steam specialties, announce the Inferno Double Row Gauge Cocks, with reversible copper seating disc—two rows of seats on each side.

The gauge cocks are available in either stainless or ordinary forged steel for working pressures to 1000 lb. Both sides of the seat disc can be used. Reversing the disc is a simple operation. Change the pin to the extra hole in the handle bracket and you have a new row of seats on the disc. All of the gauge cocks are fitted with renewable stainless steel tips, hardened for long, dependable service.

The Inferno Company's double row gauge cock, also available with pull chain attachment. Note the seating disc on end of handle, which turns freely by hand.

Additional information is available from the manufacturer. For your copy of Bulletin No. 18-C, simply circle the item number on one of the reader service post cards provided on pages 17 and 18.

Strap Joints Produced by Spot Welding Technique

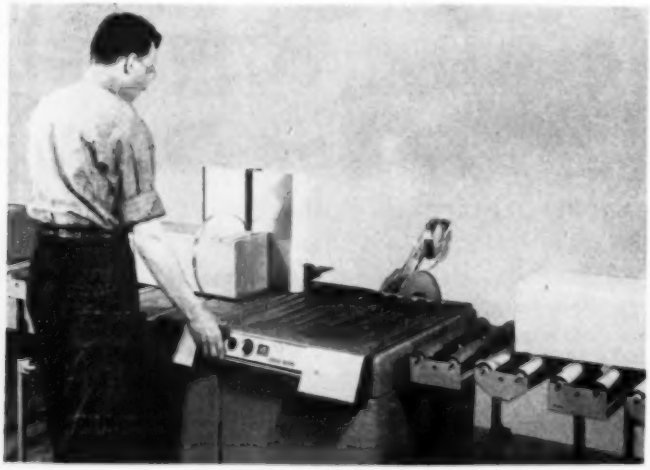
J-4 ACME STEEL COMPANY, 2840 Archer Ave. Chicago, Ill., has developed a new power-driven strapping machine, designed to produce strap joints by spot welding.

Featuring a streamlined, color-coordinated housing for integration into standard-type conveyor lines, the strapping machine produces welded joints with strengths approaching the tensile strength of the size of strapping used. The machine can accommodate many different package sizes.

The machine's 31 in. table height permits it to be installed in standard-height conveyor systems. The machine is 43⅛ in. wide by 45 in. deep by 47 in. high. It weighs 1350 lb.

All operations formerly requiring physical effort are now done by the machine. Also, skilled labor is not necessary for operation. Women

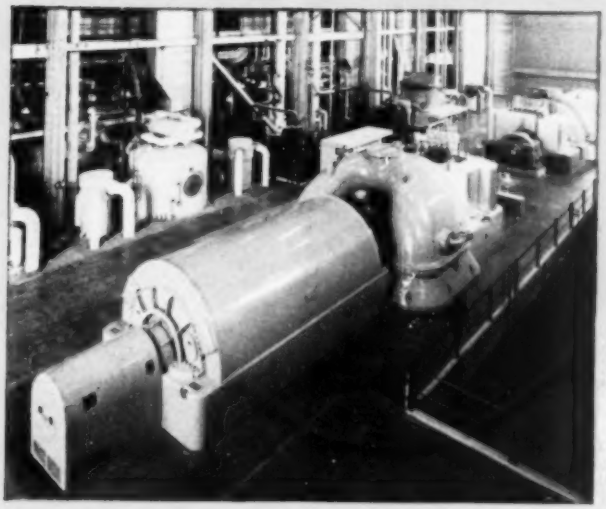
(Continued on page 98)



Packages approach *Acme Steel Company's* power-driven strapping machine on a roller conveyor from the right. After strapping, they leave the machine from the left. There is no manual lifting. When a package is centered over strapping mechanism, operator simultaneously feeds out the required length of strap by deflecting the strap-feed pedal with his foot while guiding the strap around the package and into the V-shaped guide slot in the table top with his right hand. Left hand holds package in place against the back guide. Guide slot in the table top automatically centers and locates the entering strap.

When the strap is around the package, the operator actuates the cycle bar under the control panel with his right hand. This causes the strap to be tightened around the package to a predetermined tension, cut from the coil, and then joined by welding. Entire operation is completed in a matter of seconds.

"Through performance alone... inhibited turbine oils have won preference among major utility operators"



... and here's why so many of them choose **SHELL TURBO OIL**

Shell Turbo Oil exceeds every accepted specification for premium turbine lubricants. These are the notable qualities:

1. HIGHEST ATTAINABLE RUST PROTECTION

An effective *combination* of rust inhibiting additives goes to work at the source of rust formation. Rust problems are reduced to the very lowest level.

2. COMPLETE OXIDATION STABILITY

The anti-oxidant in Shell Turbo Oil has so far defied improvement! It provides outstanding oxidation stability and thereby minimizes sludge formation.

3. ANTI-FOAMING

The anti-foam agent used is so effective that air entrainment can be tolerated for considerable periods—avoiding unscheduled shutdowns.

4. EXCELLENT EMULSION CHARACTERISTICS

Shell Turbo Oil's remarkable protection against rust and oxidation is attained with the minimum tendency to formation of water emulsions in service.

5. PROTECTION AGAINST WEAR

The inhibitive agents in Shell Turbo Oil *add* to the wear-reducing qualities of the specially refined oil itself, an extra margin of safety for the bearings during critical starting periods.

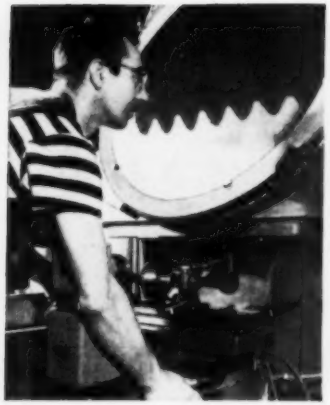
We'll be glad to give you the full story on Shell Turbo Oil, with specific recommendations for your own generating units.

SHELL OIL COMPANY

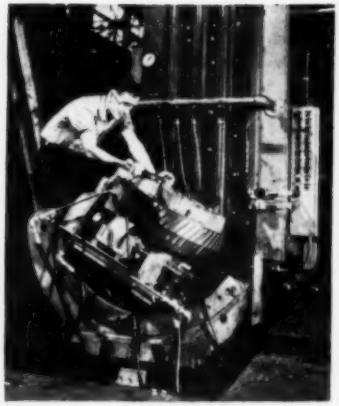
50 West 50th Street,
New York 20, New York,
or 100 Bush Street,
San Francisco 6, California.

SHELL

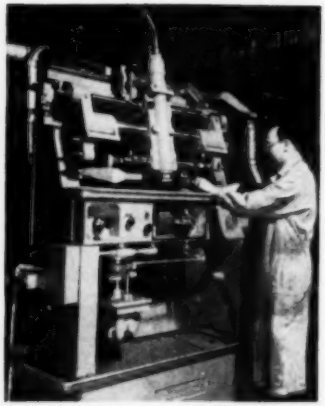
SHELL TURBO OIL



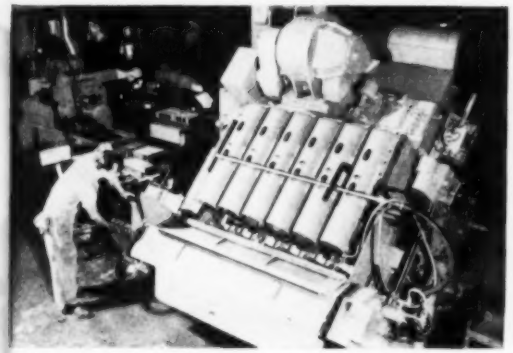
This accuracy check on turbine bucket dovetails is one of many quality controls.



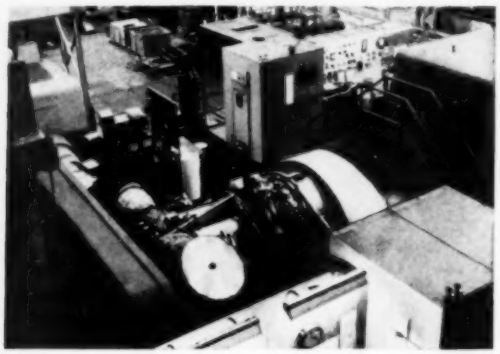
Automatically operated, this three-station broach cuts dovetails in compressor wheels.



An automatic polisher brings machined compressor blades to their final contour.



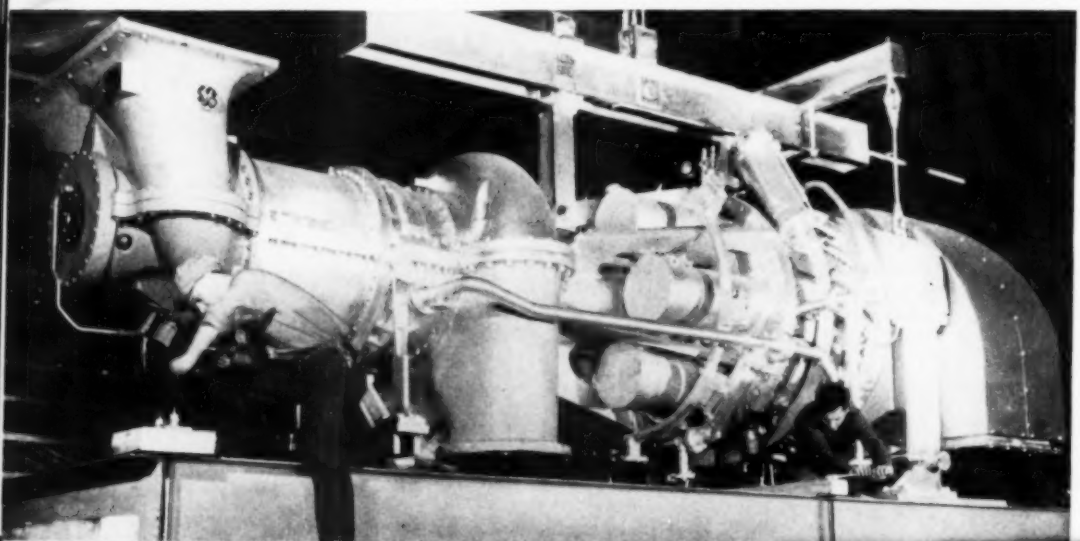
This machine simultaneously cuts six compressor blades or turbine buckets from blank stock to within 0.005 in. of finished dimension.



Testing includes checking of mechanical balance, performance, bearing operation and emergency and speed regulating governors.

General Electric's Gas Turbine Plant

ASSEMBLED UNITS LEAVING THE FACTORY ARE READY FOR PERMANENT INSTALLATION WITH A MINIMUM EXPENDITURE OF TIME AND LABOR.



One of the bays in General Electric's gas turbine plant at Schenectady, N. Y. Units are being assembled for locomotive, pipeline pumping, and power generation service.

Now Tooled for Continuous Production

With the recent addition of a number of specialized machine tools, General Electric's gas turbine manufacturing facilities are virtually complete. Production, testing, and shipment are on a regular schedule in the Schenectady, N. Y., plant. In fact, the 1952 order board calls for delivery of 46 units—six for freight locomotives, 34 for natural gas pumping stations, and six for power generation service in electric utilities. An even larger total will be produced in 1953.

Components for the 3500 kw simple-cycle, the 3500 kw regenerative-cycle, and the 5000 kw compound-cycle designs are in continuous production.

Recently, the first regenerative-cycle machine completed factory tests and is now being installed. This design, distinctive for its flexibility, is suitable for utility application in a variety of arrangements involving the combined use of both gas and steam turbine cycles.

Of particular importance are the refinements in manufacturing procedures which have come about as the result of operating experience with half a dozen units in customer installations. A large fund of data on fuels, design details, and performance has been accumulated.

Thus, in less than five years, a completely new development has become an established product. America's newest prime mover is making a significant contribution to the nation's over-all program for power expansion. General Electric Company, Schenectady 5, N. Y. 253-6

GENERAL ELECTRIC

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The Eagle-Picher insulation line is stocked by distributors and authorized contractors coast to coast. The one nearest you will be happy to recommend insulating materials that give your equipment highest thermal efficiency . . . reduce fuel costs . . . help provide precise temperature control.

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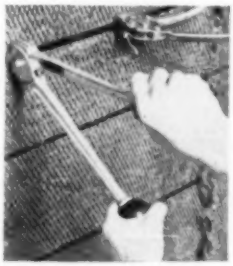
A real insulating block—not a refractory! Unequalled for insulating quality. Weighs approximately 22-24 lbs. per cu. ft. Cuts easily with knife or saw . . . fits snugly over contoured surfaces. Monolithic structure . . . high refractory value. Withstands temperatures up to 1700 F. All standard sizes, from 3" x 18" to 12" x 36" . . . in thicknesses from 1" to 4".



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611	612	623	626	644	646	705	754	760	805	820	833	837	863	864	910
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ELECTRICAL

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837 **ALUMINUM CONDUCTORS**—Free Booklet, "Insulation Questions and Answers" discusses insulated aluminum conductors and their applications. Charts, diagrams, illustrations answer basic questions—what conductor sizes, how handled, as actually installed, the details about joints and terminals.—ALUMINUM COMPANY OF AMERICA.

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992 **FIRE PROTECTION**—Bulletin 2319 describes Blaw-Knox Deluge systems, wet and dry pipe sprinkler systems, water spray and fog systems, rate-of-rise sprinkler systems, etc., and indicates how a sprinkler system pays for itself out of insurance savings. — BLAW-KNOX SPRINKLER DIV., BLAW-KNOX CONSTRUCTION CO.

Continued on page 120

8-52-2

Please send me without obligation, free booklets described in the August, 1952, issue of SOUTHERN POWER AND INDUSTRY as circled below:

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358	377	381	403	425	426	441	446	453	490	501	508	515	530	534	608
611	612	623	626	644	666	705	756	768	805	820	833	837	863	864	910
921	957	961	992	B10	B11	B12	B13	B14	B15	B16	B17	B18	B19	B20	B21
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10 DRAVO *Counterflo* HEATERS

PROVIDE COMPLETE HEATING AND VENTILATING FOR HOMESTEAD VALVE PLANT, AT CORAOPOLIS, PENNA.

Homestead Valve Manufacturing Company, makers of Hypressure Jenny Steam Cleaning Units, uses Dravo *Counterflo* Heaters three ways at its Coraopolis, Penna., plant.

1. TEMPERING MAKE-UP AIR

Pickling, washing, drying, painting, welding and testing create contaminated and unpleasant air conditions. Two Dravo Heaters supply 44,000 cu. ft. of tempered make-up air per minute for replacement of exhausted fume-laden air.

2. COMFORT HEATING

Eight Dravo Heaters maintain a 70° F. temperature throughout the 400 ft. x 100 ft. building which contains the plant, offices, lavatories and storage rooms. The choice of gas or oil as fuel guarantees warm working conditions in spite of occasional gas shortages in very cold weather.

3. SUMMERTIME VENTILATION

During hot spells, the heater fans circulate air throughout the building, thus keeping employes more comfortable.

DRAVO HEATERS OFFER YOU . . .

LOW INITIAL COST—Users report 30% to 60% savings over "wet-type" systems.

EASY INSTALLATION—Need only fuel, exhaust and electrical connections . . . no ductwork.

LOW OPERATING COST—Direct-fired . . . burn gas or oil . . . readily converted . . . minimum efficiency 80%.

AUTOMATIC OPERATION—On-off or modulating controls . . . no constant attention needed.

LONG SERVICE LIFE, LOW MAINTENANCE—Stainless steel combustion chamber eliminates refractory lining.

SAFETY—Approved by American Gas Association, listed by Underwriters' Laboratories, Inc.; Dravo standardized safety control circuit accepted by Factory Mutual Engineering Division.

MOBILITY—Can be moved to any location.

FLEXIBILITY—When floor space is limited, can be wall-hung or suspended from trusses in any position.

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Heating Department, Dravo Corporation
Dravo Building, Fifth and Liberty Avenues
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I would like more information about Dravo Counterflo Heaters. Please send me Bulletin No. EF-52 -24

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Company _____

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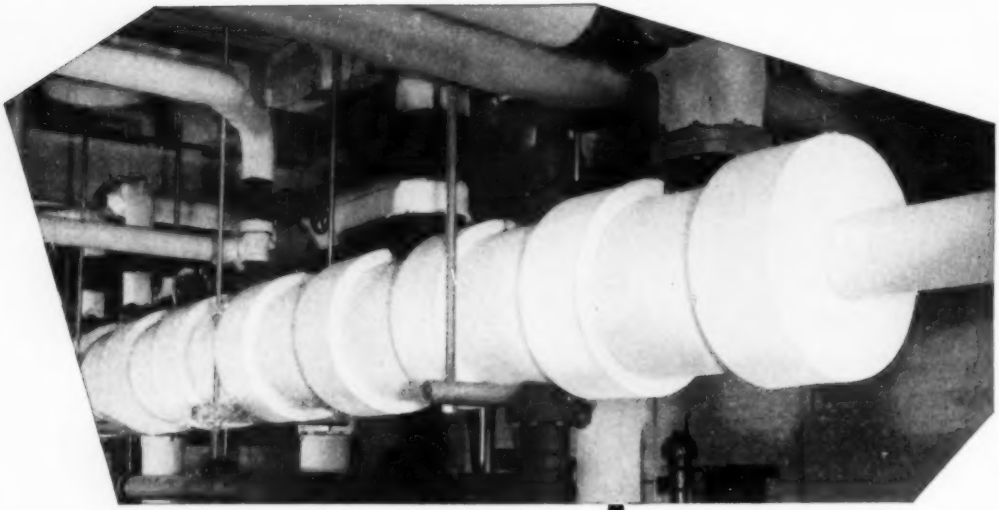

MAKE TOUGH JOBS EASY
WITH EASY-TO-USE

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PIPE INSULATION

Ask any user about Unibestos! He'll tell you how easily this good insulation is cut and fit on-the-job, for Unibestos is light, strong, firm—saws cleanly for tight joints—retains initial high efficiency. It is unaffected by service hazards.

Whether you specify Unibestos No. 1200 (for temperatures up to 1200°F.), Unibestos No. 750 (for temperatures up to 750°F.), or Amocel for commercial uses (temperatures up to 600°F.), you'll always save in two ways: (1) quick and simple application; (2) long-lived durability. Your Unarco Distributor can supply you quickly from his stocks of these pipe insulations. Also available in block form for temperatures up to 1200°.

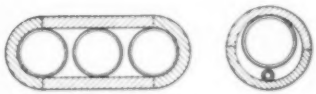
For details on these insulations, ask for Bulletin No. 76-109.

UNARCO

Write or call
333 Candler Building
Atlanta, Georgia
Telephone *Lamar 7113*

SEE HOW THESE TYPICAL APPLICATIONS ARE SIMPLIFIED

Unibestos pipe insulation is particularly adaptable for insulating irregular surfaces such as flanges, valves, and fittings. Its firmness and easy-to-fit characteristics make such jobs easy; save time.



Unibestos pipe insulation and block can be used separately or in combination for insulating nested and traced lines quickly and economically.

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EASIER TO HANDLE. Light and flexible.

LESS COSTLY TO STOCK. One cable — versatile Durasheath—meets all electrical distribution needs.

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Save splices and you save money! No more do you have to use one type of cable for underground distribution . . . another for overhead . . . and a third for conduits. You can run durable Durasheath* *in one continuous length for all these locations.*

Durasheath is normally stocked for applications up to 5,000 volts, and is available on order for higher voltages, for traffic control, airport† power and lighting, mines, industrial plants, railroads, street lighting and many other uses. See your Anaconda Representative. Ask for quotations. Anaconda Wire & Cable Company, 25 Broadway, New York 4, New York. 52370A

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the right cable for the job **ANACONDA®** wire and cable

IT'S PACKED WITH SATISFACTION WHEN IT'S PACKED WITH **R/M**

In hydraulic systems, as in this hydraulic accumulator ram, and all kinds of fluid-handling equipment, Raybestos-Manhattan Packings and Gaskets are assurance of continuous trouble-free operation. The R/M distributor near you will help you select the right R/M Packings and Gaskets for your valves, pumps, compressors, tanks and other equipment. Call him in.

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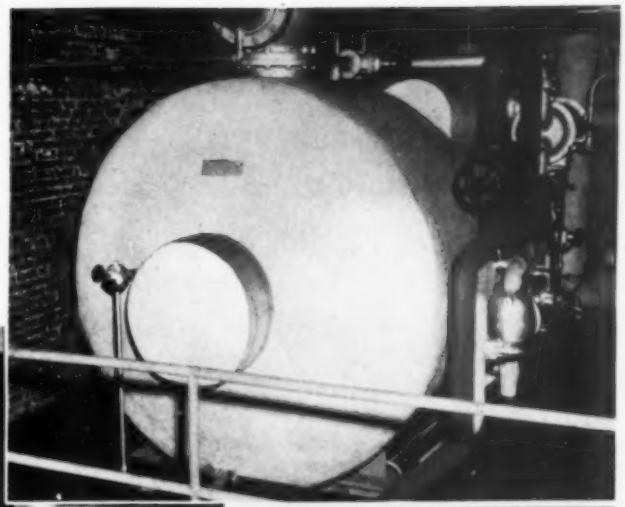
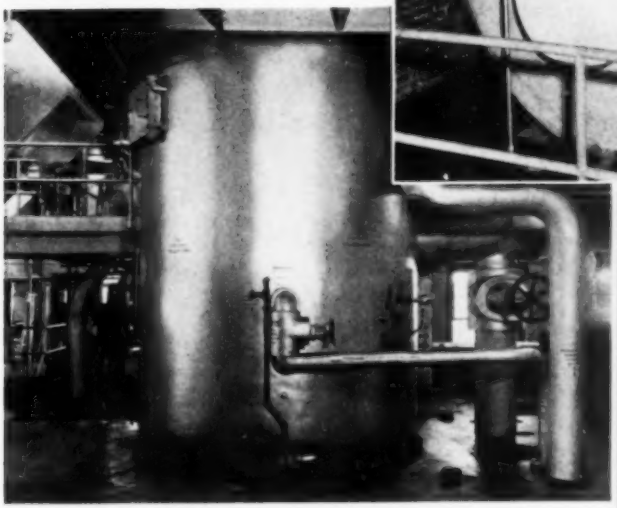
Central Station

DEAERATING EQUIPMENT

by CONSECO



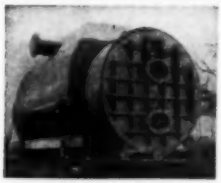


HORIZONTAL

VERTICAL

BOILERS

EVAPORATORS



CONDENSERS

REFINER FILTERS

The two units shown here are installed in the central station of a large New England public utility. Each unit represents the very latest in engineering development and was designed and built by CONSECO. They are typical examples of CONSECO'S long, specialized experience on heat transfer equipment of all kinds.

VERTICAL

This vertical tray type Deaerating Feed Water Heater delivers 588,000 lbs. water per hour at a maximum of .005 cc per liter oxygen concentration. It is fitted with vent condenser and integral storage system. It operates with extraction steam.

HORIZONTAL

The horizontal unit illustrated is a tray type Conesco Deaerating Feed Water Heater delivering 150,000 lbs. of water per hour at maximum .005 cc per liter oxygen concentration. It was designed with an internal tray section having special construction arrangements to meet requirements of limited headroom.

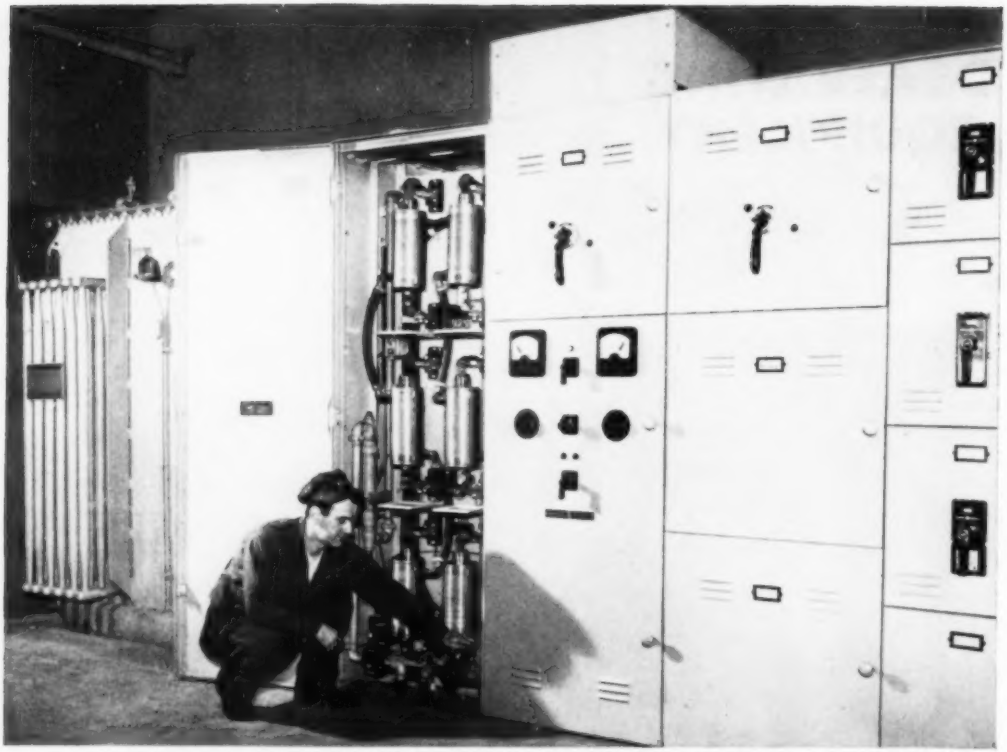
CLOSED HEATERS

STEAM JET AIR EJECTORS

Send for illustrated literature. Ask Conseco Engineers for recommendations on condenser and heat exchanger equipment to meet your requirements and guaranteed to meet or exceed performance specifications.

CONSECO **Condenser Service & Engineering Co.**

HOBOKEN, N. J.



THIS G-E RECTIFIER AT ALLIANCE HAS REQUIRED NO MAINTENANCE SINCE INSTALLATION IN 1950.

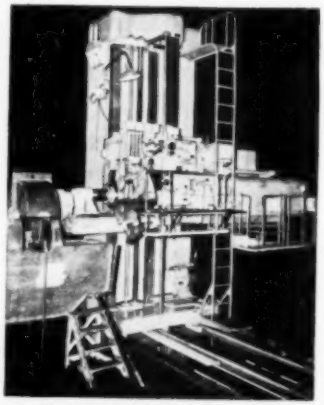
Producer of world's largest cranes uses 300-kw rectifiers for DC power

Alliance Machine Co. gains higher line efficiencies by using General Electric Ignitron Power Rectifiers

In the manufacture of mammoth cranes and other heavy factory equipment, the Alliance Machine Company, Alliance, Ohio, depends on the d-c power from its G-E Ignitron Rectifiers to run hundreds of machine tools throughout the plant.

Installed late in 1950, the mercury arc rectifiers have been in service ever since, requiring no maintenance, with not even a tube needing replacement.

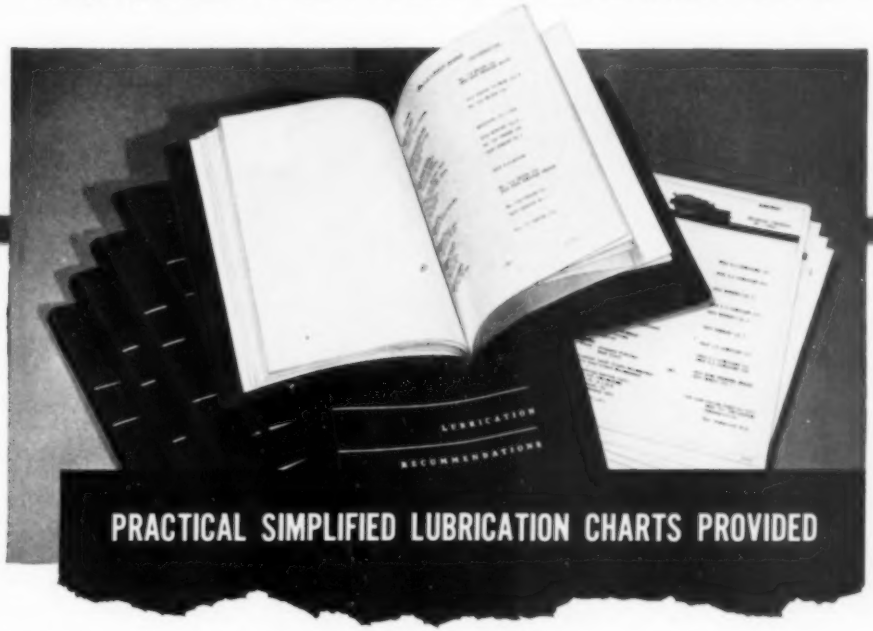
The G-E Ignitron Rectifiers, such as those at Alliance, operate 24 hours a day, 7 days a week. Supplied as a complete packaged unit with transformer and metal-enclosed switchgear, the installation occupies minimum space. For information on a G-E Ignitron Rectifier to fit your d-c power needs, call or write your nearest G-E sales office. General Electric Company, Schenectady 5, N. Y. 324-7



This giant boring mill operates on d-c power supplied by the 300-kw G-E Ignitron Rectifiers at Alliance.

GENERAL ELECTRIC

How Gulf Periodic Consultation Service helps plants cut lubrication and maintenance costs



PRACTICAL SIMPLIFIED LUBRICATION CHARTS PROVIDED

You'll find a Gulf Lubrication Engineer does more than simply recommend the proper oils and greases for every type of equipment in your plant. He offers effective help on every phase of lubrication!

After he has completed a survey of your plant equipment and operating conditions, for example, he will offer two types of lubrication aids. The first, a master lubrication chart in book form which is to be retained in the maintenance office, contains an itemized list of all your equipment together with recommended Gulf lubricants and methods of application. The second, a group of plastic bound wall charts, is provided for each department or section. These durable charts are used in or near the department or section to which they apply.

This system has proved to be very practical without being cumbersome—the oilers have a permanent, convenient reference chart near the point of lubricant application, and their supervisors have an effective means of controlling the over-all picture.

For additional information on this cost-saving plan, call in a Gulf Lubrication Engineer today or send the coupon below.

GULF SERVES INDUSTRY

Gulf Oil Corporation · Gulf Refining Company SPI
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Please send me, without obligation, a copy of the booklet "Gulf Periodic Consultation Service."

Name .....
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Be sure you pick the right tubing

● The faster you run your equipment, the more expensive is every hour of down time.

But today's conditions are demanding full speed, continuous operation and coupled with high pressures, high temperatures and severe corrosive conditions are bound to take their toll of pipe and tubing. There's one practical way to cut loss of production to a minimum: be sure you are using the best and most economical tubing for the job.

It pays to get expert advice on every tubing problem. That's why we remind you that National Tube is the world's largest and most experienced manufacturer of steel tubular products. We can give you highly specialized advice on the selection of alloy steel tubing analyses for your particular job.

This applies whether you're rehabilitating present equipment or expanding your facilities. Bring your problem to "Tubing Headquarters."

Write today, if you'd like further information.

USS

NATIONAL TUBE DIVISION, UNITED STATES STEEL COMPANY, PITTSBURGH, PA.
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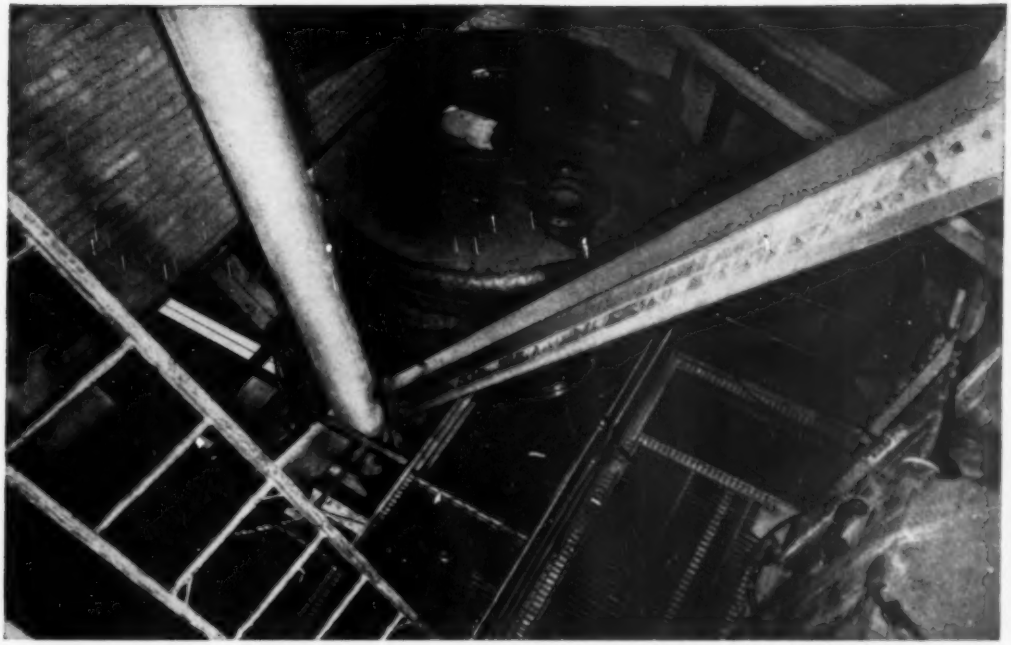
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

U·S·S NATIONAL *Seamless* ALLOY TUBES

UNITED STATES STEEL



STAINLESS STEEL DEAERATING TANK is hoisted in place during construction of one of Detroit Edison Company's Heating Plants at Detroit, Michigan.

When CO_2 Caused a Headache ...Worthington Cured It

Detroit Edison had the solution to its problem—the problem of CO_2 in its steam—except for one thing.

Zeolite-softened municipal water used in their steam plant contains high percentages of carbonates which decompose and generate CO_2 in the boilers. Carried over with the steam into heating and processing equipment, that CO_2 could cause plenty of trouble.

The CO_2 problem was solved by Detroit Edison engineers by acid treating the softened water, converting the carbonates to CO_2. The gas thus formed is driven off in a deaerator.

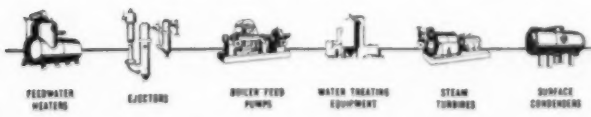
However, no standard deaerator could successfully remove the large quantities of CO_2 released by the acid treatment, and deliver water to the boiler with practically zero oxygen and zero CO_2. Furthermore, standard materials would have lasted only a few months under such conditions.

NON-CONTAMINATED STEAM

Worthington provided the answer. Detroit Edison engineers selected a Worthington deaerator specially designed for these severe conditions, built entirely of stainless steel, and guaranteed to deliver water containing not over 0.005 ppm of oxygen and not over 0.1 ppm of CO_2. The result is steam containing so little CO_2 that the amount *cannot be accurately measured!*

On problems like this one, Worthington not only furnishes *all* of the equipment needed in a complete water treating installation, but also has the engineering ability to work with your engineers on the *complete* problem of generating steam for power or processing. For further information on why *there's more worth in Worthington*, address Worthington Corporation, formerly Worthington Pump and Machinery Corporation, Steam Power Division, Harrison, New Jersey.

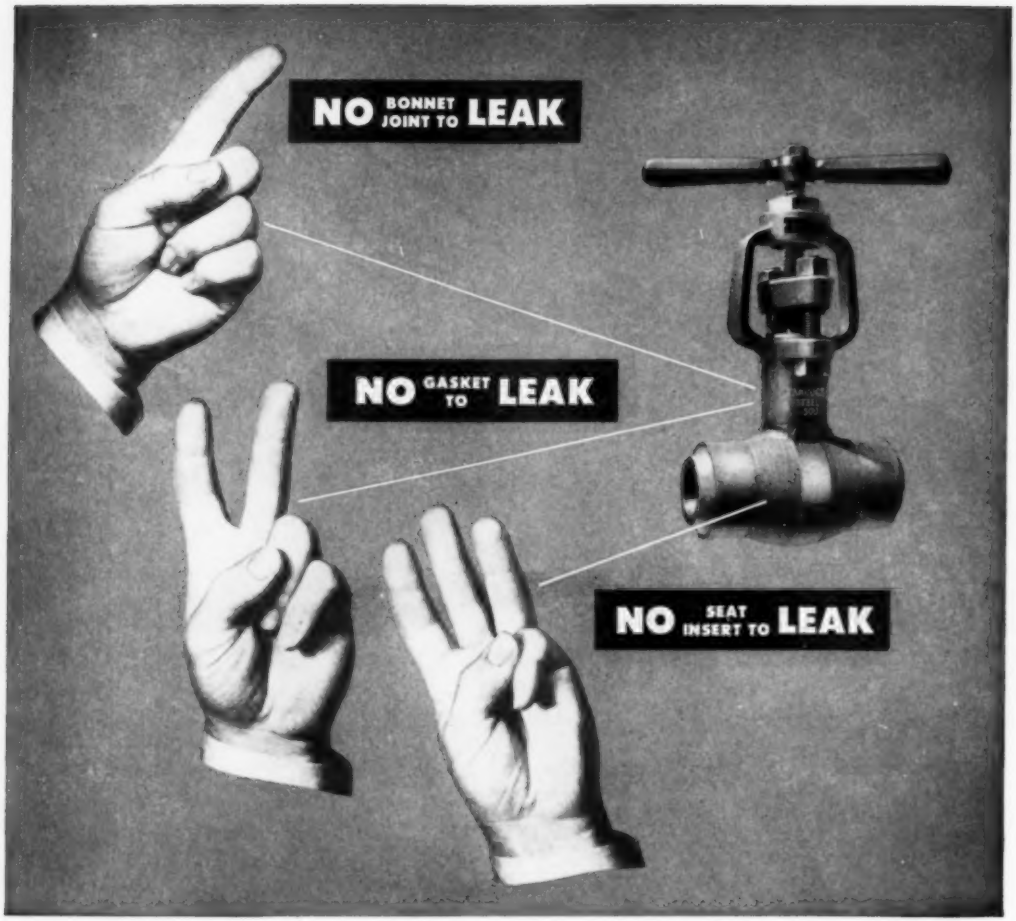
512



A GREAT TEAM IN STEAM

WORTHINGTON

Feedwater Heaters



HANCOCK 1500# and 2500# WELDVALVES are designed specifically for high-pressure, high-temperature steam plants – are safe, dependable in the severest service. No bonnet joint, gasket or seat insert to cause trouble. The life of the integral stellite seat and disc is permanent. Self-compensating yoke protects seat and disc against wire drawing leaks and damage. No excess weight to create piping strains – compactness saves space. The valve stays in the line for servicing.

Two valve bodies ($\frac{3}{4}$" and $1\frac{1}{2}$") take care of all pipe sizes from $\frac{1}{4}$" through 2" – simplify inventory and maintenance. Service rating up to 2500# W.S.P. – 1050°F., and 6000# O.W.G. – 100°F.

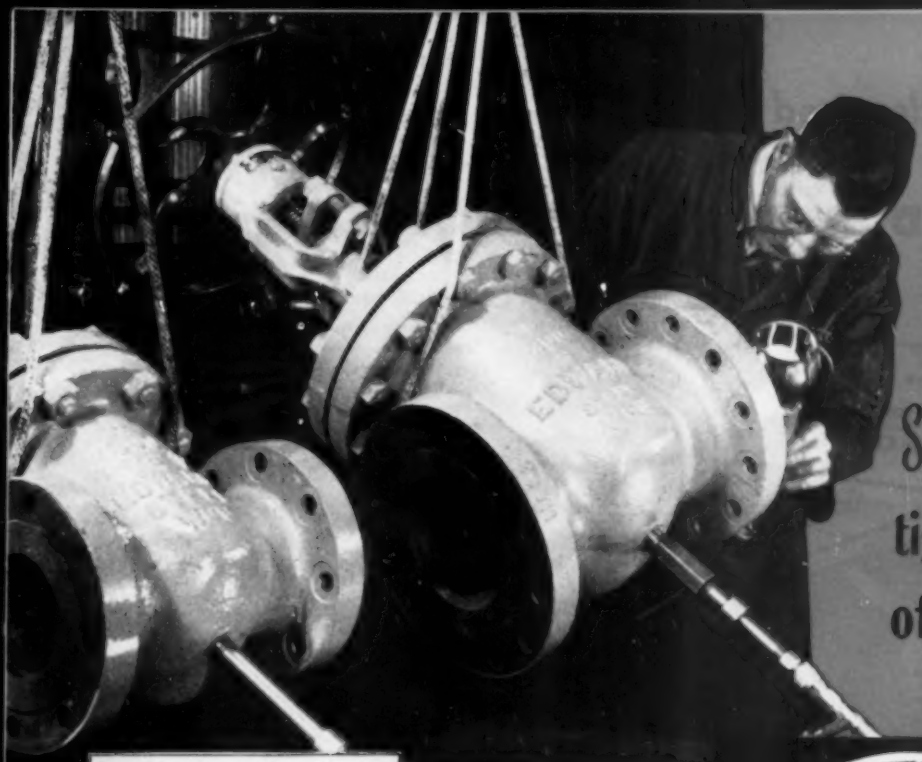
End the costly hazards of valve leakage. Install safe Hancock WELDVALVES. Call your nearby Hancock Distributor for prompt delivery

When Hancocks go in, valve costs go down

HANCOCK VALVES

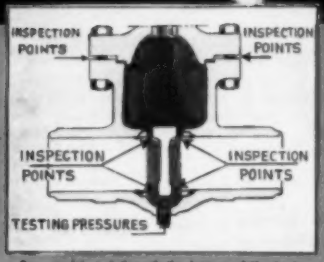
A product of **MANNING, MAXWELL & MOORE, INC.** WATERTOWN 72, MASSACHUSETTS

MAKERS OF 'HANCOCK' VALVES, 'ASHCROFT' GAUGES, 'CONSOLIDATED' SAFETY AND RELIEF VALVES, 'AMERICAN' INDUSTRIAL INSTRUMENTS. BUILDERS OF "SHAW-BOX" CRANES, 'BUDGIT' AND 'LOAD LIFTER' HOISTS AND OTHER LIFTING SPECIALTIES.

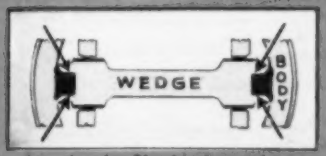


EXCLUSIVE TEST METHOD PROVES *Simultaneous* tight seating of both faces of

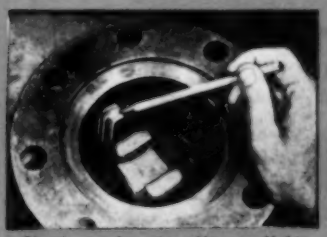
Edward GATE VALVES



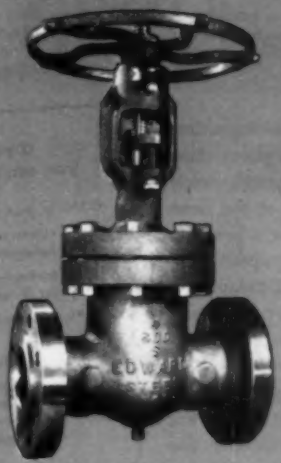
Pressure injected through the bottom of the body surrounds seats, yet leaves both ends open for simultaneous inspection in Edward testing method.



Arrows show where Edward oil clearances between wedge and guide ribs to eliminate wedge drag on seats. With Edward gate valve, partial turn of handwheel transfers load from seats to wedge guides.



Edward gate valve wedge guides are welded to body after seats are in place, therefore moving parts are accurately located. Seat rings are also welded in to prevent leakage between seats and body.



When Edward engineers began the design of a new series of steel gate valves they tested other makes. Many of them were tight on one seating face or the other, but few were tight on both faces.

To build really tight gate valves, Edward engineers discarded the conventional method of casting guide ribs as part of the body and instead developed a new technique for welding the ribs into the body *after the machined seating faces were in place*. This, they demonstrated, reduced machining tolerances, eliminated wedge drag on the seating faces, and cut wear. They were also sure it meant a tighter valve.

But how to prove it? The result was the testing method shown above. Now, *all* Edward gate valves are tested with both ends open for simultaneous inspection, and both seating faces must be tight simultaneously.

The new Edward gate valves incorporate many other gate-valve features, such as welded-in seats, one-piece bonnets, ball bearing yoke bushings in most sizes, and Stellite faced seating surfaces. With Edward, these features are standard construction.

For more details write for Catalog 12-E.

122 West 144th Street

Edward Valves, Inc.

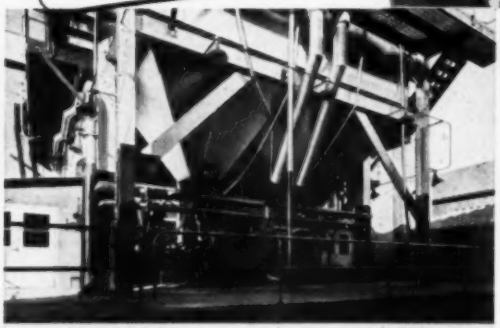
SUBSIDIARY OF ROCKWELL MANUFACTURING CO. EAST CHICAGO, INDIANA

"We modernized our plant, installed new COAL-burning equipment, AND CUT OUR FUEL COSTS 45%!"

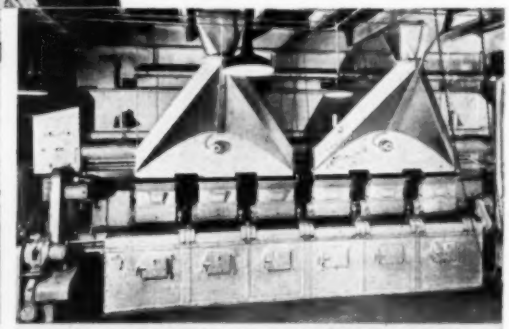
says MR. A. J. GOETZ, Executive Vice President, River Raisin Paper Co., Monroe, Michigan.

"We recently modernized our entire plant following an extensive engineering survey. New coal-burning and coal-handling equipment was installed . . . heat losses were reduced . . . efficiency raised. As a result, our fuel costs have been cut 45 to 50%—proving to us that you just can't beat bituminous coal burned the modern way."

"In Addition, Automatic Coal- and Ash-Handling Equipment Cuts Labor Costs 60%!"



This view shows how River Raisin has installed its modern fly-ash reinjection system at the rear of the boilers but outside the plant. The plant also features outdoor coal handling to save additional interior space.



"We chose these modern spreader stokers for their advantages of low maintenance, low power requirements, and their ability to meet fairly rapid load changes. They give us maximum efficiency under all operating conditions."

Modernizing your present plant? Building a new one? In either case let a consulting engineer show you exactly how you can meet your *specific* needs with a modern coal installation—and at the same time save more money than you thought possible.

Automatic coal- and ash-handling equipment can cut your labor costs to a minimum. And, today, with a modern combustion installation, you can actually get 10 to 40% more power from each ton of coal than was possible a few years ago.

Moreover, with coal you'll never have to worry about a shortage of fuel. America's coal reserves are virtually inexhaustible, and this coal is mined by one of America's most efficient and productive industries. This means that coal users—unlike those committed to other fuels—get the advantage of dependable future supply as well as more stable prices.

If you operate a steam plant, you can't afford to ignore these facts!

COAL in most places is today's lowest-cost fuel.

COAL resources in America are adequate for all needs—for hundreds of years to come.

COAL production in the U. S. A. is highly mechanized and by far the most efficient in the world.

COAL prices will therefore remain the most stable of all fuels.

COAL is the safest fuel to store and use.

COAL is the fuel that industry counts on more and more—for with modern combustion and handling equipment, the inherent advantages of well-prepared coal net even bigger savings.

BITUMINOUS COAL INSTITUTE

A Department of National Coal Association, Washington, D. C.

FOR HIGH EFFICIENCY ★ FOR LOW COST

YOU CAN COUNT ON COAL!

Good Control solves problems

The combustion efficiency of your boiler depends almost entirely upon the performance of the combustion control system. When you specify Hagan Combustion Control Equipment, you specify dependable accuracy and reliable performance year after year.

Remember: *if as little as one percent* of the fuel is wasted throughout the life of the boiler, the cost of this wasted fuel can amount to five, six, or even seven times the original cost of the control system.

So, from this viewpoint alone, you cannot afford to buy anything less than the best—Hagan Automatic Combustion Controls.

Our engineers have a tremendous backlog of experience with all types of combustion control applications. Let them put this experience to work for you.

For full information, wire, call, or write:

HAGAN CORPORATION

HAGAN BUILDING, PITTSBURGH 30, PA.

HAGAN HALL BUROMIN CALGON

BOILER COMBUSTION CONTROL SYSTEMS
RING BALANCE FLOW AND PRESSURE INSTRUMENTS
METALLURGICAL FURNACE CONTROL SYSTEMS
CONTROL SYSTEM FOR AUTOMATIC AND
AERONAUTICAL TESTING LABORATORIES

TWO TERRY TURBINES IN RECORD NON-STOP RUN AT CITIES SERVICE

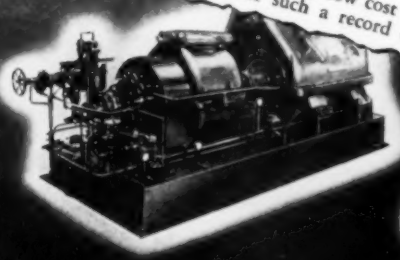
After 26 Months of Continuous Operation, Cost of Replacement Parts Only $78.00 for Each Turbine

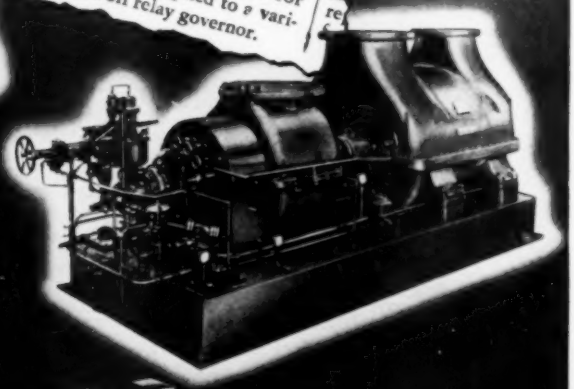
Two Terry turbines recently completed a record non-stop run at the East Chicago refinery of Cities Service Oil Company. Specially designed for driving air blowers on fluid catalytic cracking, they ran continuously *from initial start up*, day and night, for two years and two months. Throughout the entire run neither turbine suffered any noticeable reduction in efficiency.

On inspection, after shutdown, it was found that the only parts showing signs of wear were the shaft packing rings. These were replaced at a total cost of $78.00 for each turbine.

While this extremely low cost for repairs, after such a record run, could not have been anticipated, Cities Service had good reason to expect outstanding performance from Terry turbines. A four-year record of 216 Terry turbines at the Lake Charles refinery of this same company showed amazingly low maintenance costs. During this period, the yearly cost of replacement parts averaged only 1.4% of the initial investment.

The two turbines at East Chicago are rated 2450 horsepower at 5030 rpm. Each is equipped with a trip throttle valve, forced feed lubrication, and regulator for process control applied to a variable speed oil relay governor.



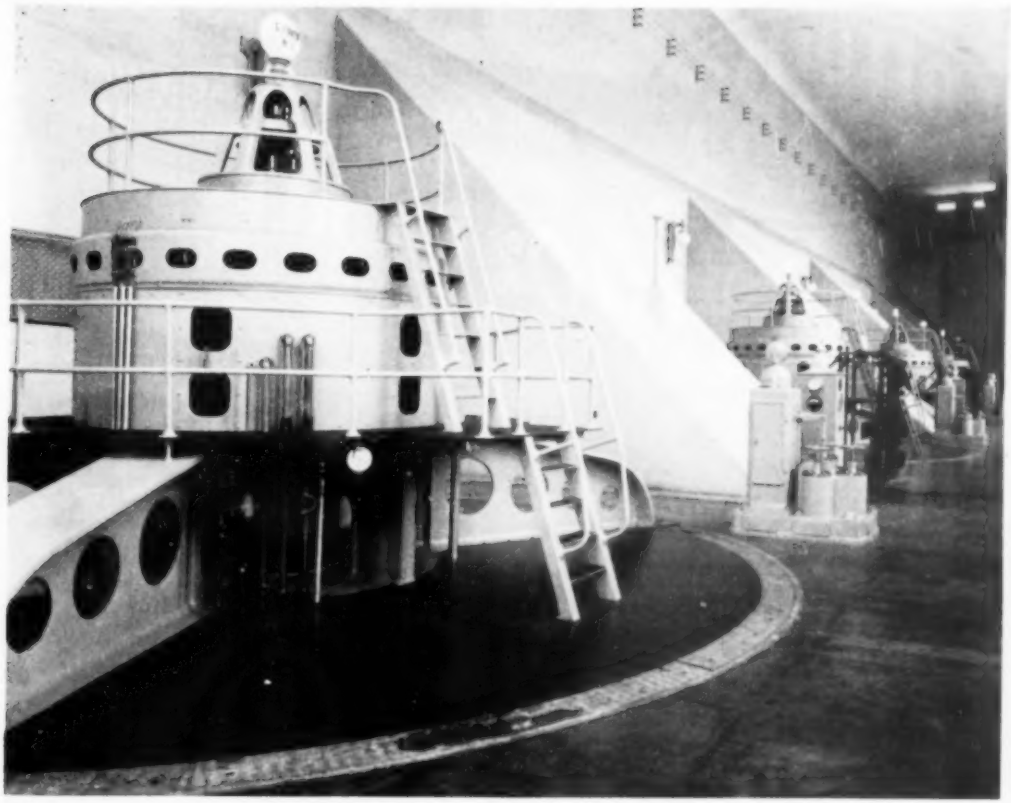


For more information about Terry multistage turbines, send for a copy of Bulletin S-146. No cost or obligation.

TERRY

THE TERRY STEAM TURBINE CO.
TERRY SQUARE, HARTFORD 1, CONN.

TT-1193



Preventive Maintenance

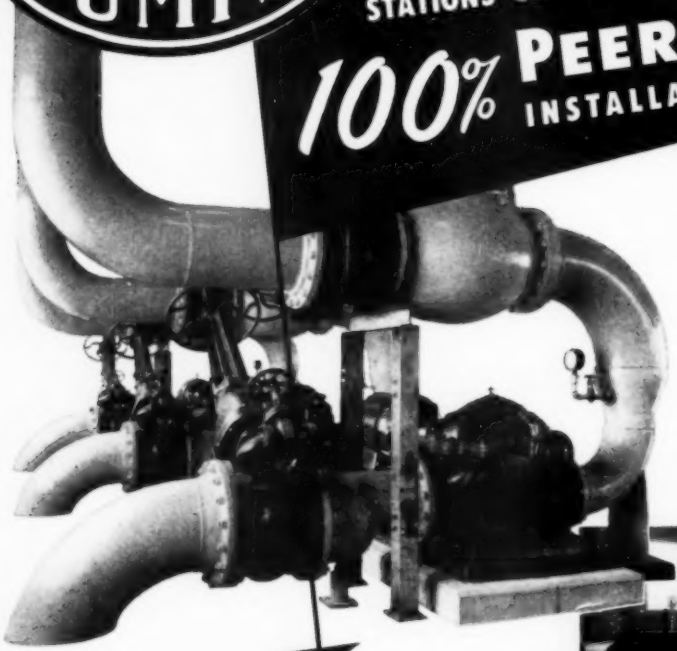
IN TURBINE OPERATION there are many conditions which influence the performance of the turbine oil. And in no other phase of lubrication is there such a great need for preventive maintenance—selecting the proper oil is of vital importance. Factors to be taken into consideration are correct body, high film strength, high chemical stability, great separating ability and anti-rust properties. Standard Oil turbine oils are noted for possessing each of these qualities. They are refined by the most modern methods from specially selected crudes, assuring high resistance to oxidation and ability to maintain body under the severest conditions. To solve your lubrication problem, consult a Standard Oil representative. His constant contact with power industry, backed by the world's largest combined facilities for research, testing and engineering of petroleum products, offers you the finest service available.

Standard Oil Company
(KENTUCKY)

STANDARD OIL
LUBRICANTS

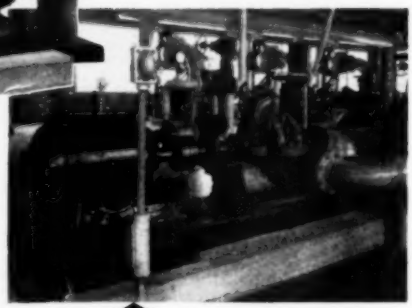
PEERLESS PUMPS

NATURAL GAS PIPE LINE COMPRESSOR STATIONS' COOLING WATER PUMPS ARE 100% PEERLESS INSTALLATIONS

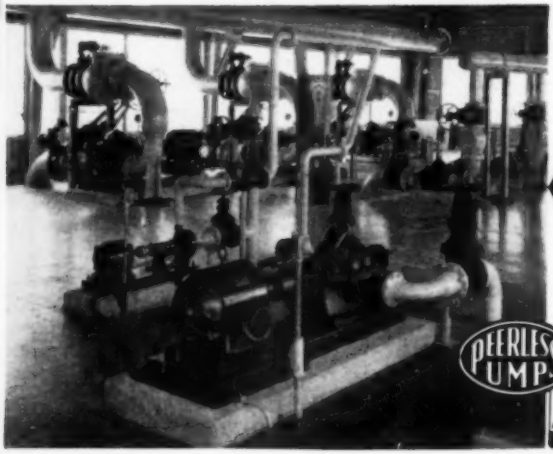


One of the most recently completed natural gas pipe lines runs from Texas to Illinois. Views here show a 100% installation of Peerless pumps in one of the typical 10,000 hp compressor stations now in operation on this line. Pumps are installed in parallel batteries to handle water flow through dual cooling units. One unit cools jacket water, the other unit cools water used in heat exchange units of the lube oil cooling system.

PEERLESS SINGLE STAGE & MULTI-STAGE HORIZONTAL PUMPS HANDLE WATER TO STATIONS' DUAL COOLING UNITS



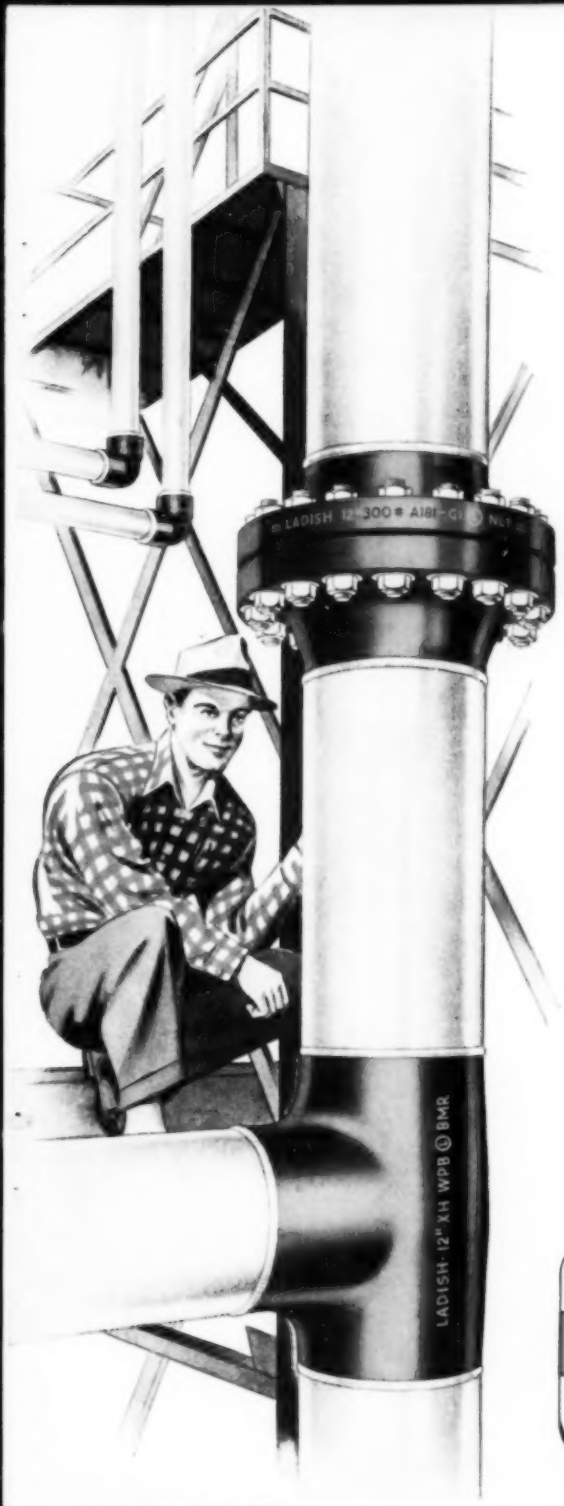
View above shows typical station arrangement of Peerless pumps installed in one of the compressor stations on the line. Single stage Peerless Type A and multi-stage Peerless Type TU pumps, both of horizontal split case design, are used to handle water to cooling systems.



View at left shows one of the multi-stage Peerless Type TU horizontal split-case pumps installed in these stations. Ample overload capacity is provided so that one or more pumps in each battery can be shut down without impairing cooling water circulation.

Write today for descriptive engineering Bulletins on both Type A and Type TU Peerless pumps.

PEERLESS PUMP DIVISION
FOOD MACHINERY AND CHEMICAL CORPORATION
Address inquiries to Factories at:
Los Angeles 31, California and Indianapolis 8, Indiana
Offices: New York, Chicago, St. Louis, Atlanta, Dallas, Plainview and Lubbock, Texas, Fresno, Los Angeles, Phoenix, Albuquerque, N. M., Tulsa



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Controlled Quality

PIPE FITTINGS

maximum service assured by metallurgical soundness

Sound metallurgy . . . the result of unsurpassed facilities and advanced laboratory controls . . . provides the maximum of dependability in Ladish Controlled Quality fittings. Every phase of metal quality . . . composition, structure and physical properties . . . is continuously safeguarded—and certified proof of metallurgical integrity is available to users of Ladish fittings.

TO MARK PROGRESS

THE COMPLETE *Controlled Quality* FITTINGS LINE
PRODUCED UNDER ONE ROOF...ONE RESPONSIBILITY

LADISH CO.

CUDAHY, WISCONSIN
MILWAUKEE SUBURB

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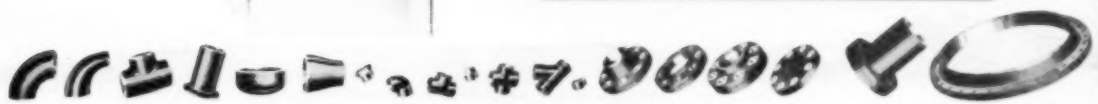
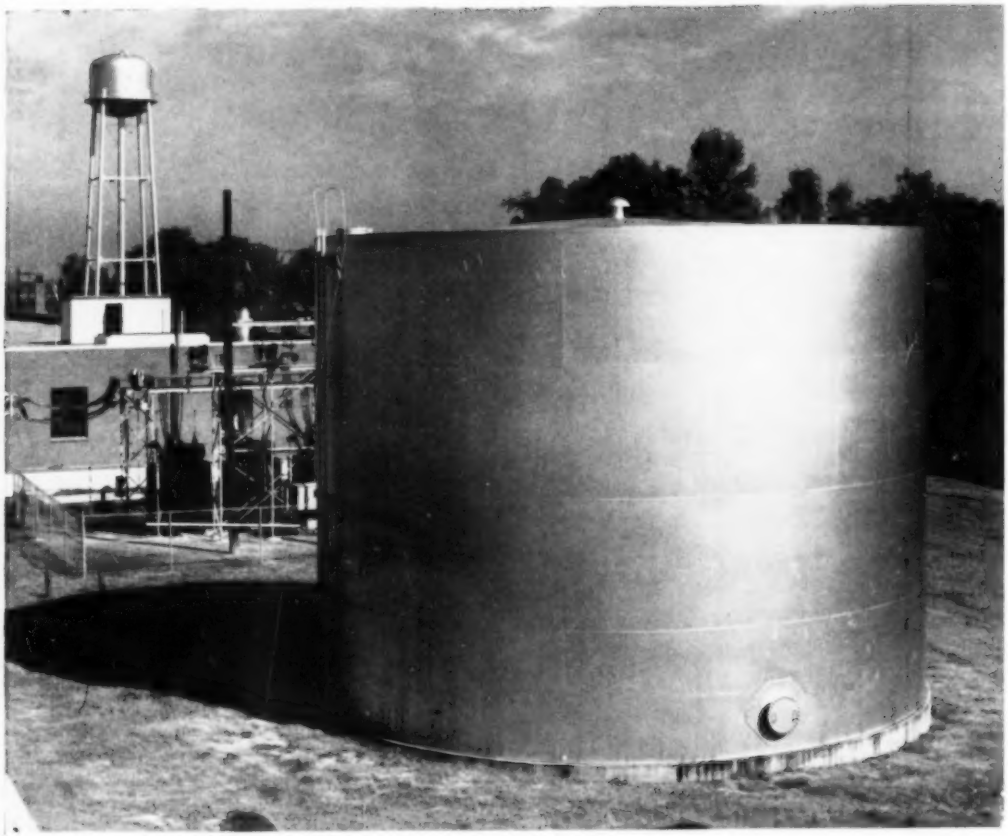




"DOUBLE TROUBLE" for FIRES

The 350,000-gallon Horton flat-bottom suction tank in the foreground of the above view and the 100,000-gallon Horton elevated tank in the background provide *real* double trouble for fires. Located at the Maverick Mills' White Horse Mill, in Greenville, South Carolina, they supply water to an automatic sprinkler system that protects 416,000 square feet of floor space.

Approximately in the center of 125 acres, about 6 miles south of Greenville, the White Horse Mill is designed for a complete operation to produce combed fabrics. Starting with the raw cotton, the fibers are combed, spun and processed until finally they emerge as grey cloth.

The entire mill is protected by automatic sprinklers installed by the Daniel Construction Company. A dependable gravity water supply is provided by the Horton elevated tank. A secondary supply of water is provided by the suction tank. The two tanks are filled with water from artesian wells and their contents are held in reserve at all times.

Horton welded steel suction tanks and Horton elevated tanks are serving industries throughout the country. Dependable gravity pressure of the elevated tank is ideally seconded by the suction tank as in the operation above, or either tank may be used singly depending upon your requirements.

Horton ellipsoidal-bottom elevated tanks are built in standard capacities from 15,000 to 500,000 gallons. Welded steel suction tanks are available in standard sizes from 50,000 to 500,000 gallons. Further information concerning Horton tanks may be had by writing our nearest office

CHICAGO BRIDGE & IRON COMPANY

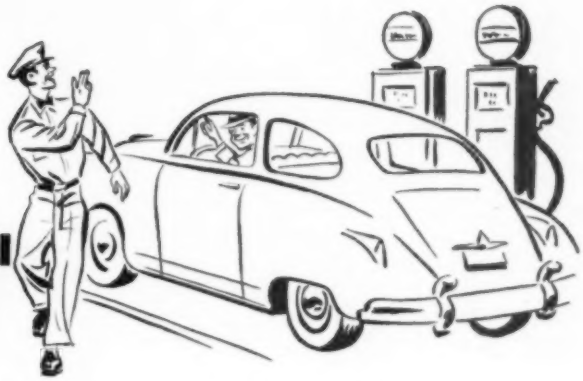
Atlanta 3.....2180 Healey Bldg.
Birmingham 1.....1531 North Fiftieth St.
Boston 10.....1044—201 Devonshire St.
Chicago 4.....2107 McCormick Bldg.
Cleveland 15.....2218 Guildhall Bldg.
Detroit 26.....1534 Lafayette Bldg.
Havana.....402 Abreu Bldg.
Houston 2.....2132 C&I Life Bldg.
Los Angeles 17...1545 General Petroleum Bldg.
New York 6.....3312—165 Broadway Bldg.
Philadelphia 3..1646—1700 Walnut Street Bldg.
San Francisco 4.....1531—200 Bush St.
Seattle 1.....1345 Henry Bldg.
Tulsa 3.....1628 Hunt Bldg.
Washington 6, D. C.....1114 Cafritz Bldg.

Plants in BIRMINGHAM, CHICAGO, SALT LAKE CITY *and* GREENVILLE, PA. *In Canada*—HORTON STEEL WORKS, LIMITED, FORT ERIE, ONT.

"SEE YOU AT THE POLLS!"

"SEE YOU AT THE POLLS!"

"SEE YOU AT THE POLLS!"



Nobody knows for sure how it started—this line about "See you at the Polls!" we're hearing all over these days.

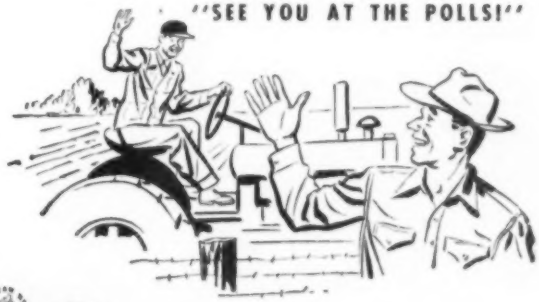
Best explanation seems to be that it came from that state candidate out west. . . . His opponent in a debate got all riled up and challenged him to fight it out in the alley.

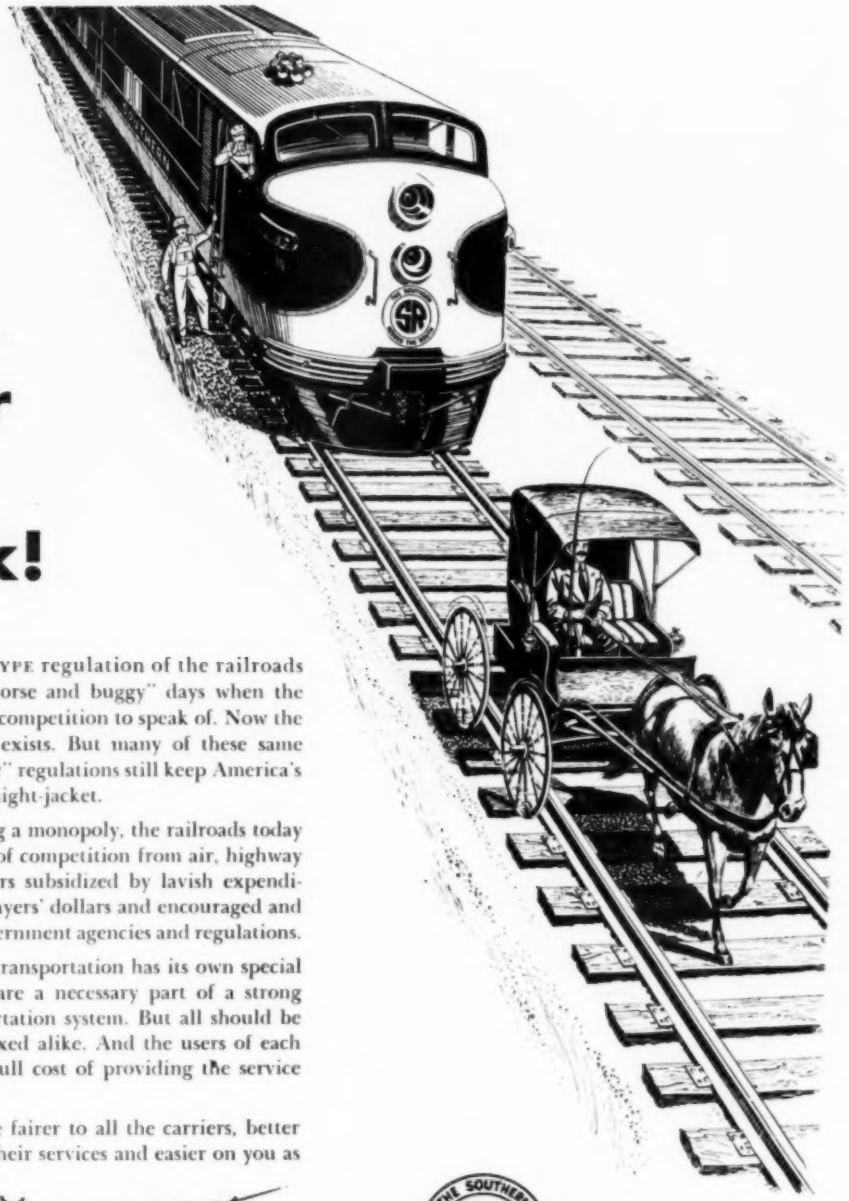
But he said—"I'll settle this the AMERICAN way—I'll see you at the polls!" And the audience picked up the chant.

Now everybody's saying it—and on Nov. 4 everybody will be *doing* it!

"SEE YOU AT THE POLLS!"

"SEE YOU AT THE POLLS!"





Let's clear the track!

MONOPOLY-TYPE regulation of the railroads dates back to "horse and buggy" days when the railroads had no competition to speak of. Now the need no longer exists. But many of these same "horse and buggy" regulations still keep America's railroads in a straight-jacket.

Far from being a monopoly, the railroads today face the keenest of competition from air, highway and water carriers subsidized by lavish expenditures of the taxpayers' dollars and encouraged and promoted by government agencies and regulations.

Each form of transportation has its own special advantages. All are a necessary part of a strong national transportation system. But all should be regulated and taxed alike. And the users of each should pay the full cost of providing the service they use.

This would be fairer to all the carriers, better for the users of their services and easier on you as a taxpayer!

Harry A. DeButts
President

THE SOUTHERN SR SERVES THE SOUTH

SOUTHERN RAILWAY SYSTEM

WASHINGTON, D. C.

You get more than just a valve—when you specify POWELL
Here is what you get: First, a valve of finest quality materials and workmanship. Second, a valve that is exactly suited to the actual service conditions. And, third, the help of Powell Engineers in determining the right valve to solve any flow control problem you may encounter.
There are more specifically adapted Powell Valves in use today than any other make.
The Wm. Powell Co.
Cincinnati 22, Ohio
Fig. 11303 W. E. 1500-pound Cast Steel Pressure Seal Gate Valve with welding ends. One of many Powell designs for Power Plants
POWELL
BRONZE, IRON, STEEL AND CORROSION-RESISTING VALVES
DEPENDABLE VALVES
SINCE 1846

COPES *Applied to Hydraulic Couplings*

GIVES PRECISE FEED AND LEVEL CONTROL

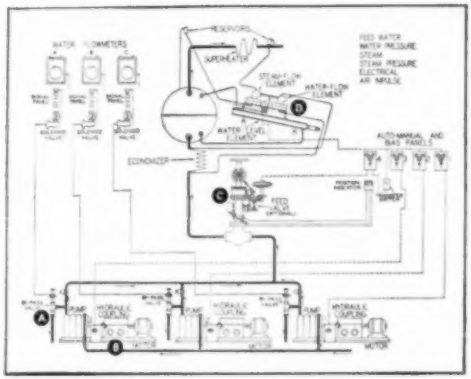
at PLANT YATES *of* GEORGIA POWER COMPANY

Remarkably close feed-flow and water-level control is being demonstrated daily by the COPES Balanced Flow Control at Plant Yates of Georgia Power Company, Newnan, Georgia. Units 1 and 2 went into service late in 1950.

Each unit includes a 3-drum, dry-bottom, radiant-type Combustion Engineering-Superheater boiler designed for a maximum continuous rating of 975,000 pounds per hour. Loads have been carried as high as 1,050,000—as low as 250,000—pounds per hour.

The COPES Control, applied through the hydraulic couplings of the feed pumps, matches feed flow almost perfectly to steam flow, and stabilizes water level within plus-or-minus one inch. Independent of meters and other controls, it can remain on full-automatic when they must be out of service for any reason. Duplicating COPES Control is on order for Unit 3, scheduled to start operation next winter. For complete data on COPES Balanced Flow at this utility write for Bulletin No. 489.

COPES-VULCAN DIVISION
CONTINENTAL FOUNDRY & MACHINE COMPANY
ERIE, PENNSYLVANIA



Schematic shows COPES Balanced Flow Control installed for each boiler at Plant Yates. Responsive to three influences—steam flow, feed flow and water level—COPES applies air impulses to position individual controller for the hydraulic coupling of each motor driven pump. Two pumps are normally paralleled, with third on standby, but any pump can be cut in or out by pushing the button to start or stop its motor.

Feed valve is normally wide open, but can be cut into automatic service at any time.

COPES Minimum Flow Control protects the pumps against overheating on light loads.

Headquarters for **Feed Water Regulators • Pump Governors • Differential Valves • Level Controls • Hi-Low Alarms • Reducing Valves • Desuperheaters**

(A) COPES Recirculating Valve used with the Minimum Flow Control System to protect the pumps on light loads.

(B) Air impulses from the COPES Balanced Flow Control actuate this controller on the hydraulic coupling to control the speed of each boiler feed pump.

(C) The COPES Feed Valve, installed in a vertical line, is normally wide open but may quickly be placed on fully-automatic, if and when this is desired.

(D) The COPES Balanced Flow Thermostat has steam-flow and water-level elements mounted rigidly on the frame of the water-level element. It is rugged.

COPES BOILER FEED WATER REGULATION

CORROSION which results from chemical or electrochemical reaction between a metal and its environment may lead to serious loss of metal, to fracture and to deposits. Corrosion deposits are usually precipitated on or near the corroded area. In certain instances, however, they may be deposited a considerable distance from the point at which the metal is undergoing attack . . . *(Ref. ASTM D 1129-51)*.

Use DREW POWER CHEMICALS

Corrosion may be active in your boiler water system now—ready to cause expensive trouble in boilers, steam and condensate lines. Serious deposits may result from corrosion. It's time now to inspect your boiler system thoroughly, to avoid inconvenience—even plant shutdown.

So, draw a bead on boiler system corrosion, Mr. Engineer. Call for the Drew Power Chemicals Engineer. The water samples and operating data he obtains in your plant will be thoroughly analyzed in the Drew Laboratories. You'll be given specific recommendations for corrective or preventive treatment. Furthermore, your Drew Engineer will give you frequent and continuous help in your plant.

Thorough investigation, proper treatment and frequent service have made Drew one of America's fastest growing water treatment companies. Consult the nearest Drew Engineer, or write for information.

Power Chemicals Division

E. F. DREW & CO., INC.

15 East 26th Street, New York 10, N. Y.

AJAX, ONTARIO
SAN FRANCISCO CHICAGO PHILADELPHIA BOSTON DALLAS

Service throughout the United States, Canada and South America

DREW PRODUCTS

NAVCO "Universal" PIPE SUPPORTS

Vertical adjustment up to 2½ inches can be made.

Support may be turned to any angle of 360°.

Will take care of 8 inches of travel.

Features

Universal Pipe Supports hold the pipe down as well as up. They prevent pipe from getting out of alignment, which is usual when Roller Supports are used.

They permit control of expansion movement and insure the desired free action of Slip Expansion Joints so essential in tunnel and duct work.

Expansion movement of pipe will not disturb the insulation.

Made in Cast Iron or Steel and provided with forced lubrication for lines exposed to the weather.

NAVCO

NAVCO PIPING

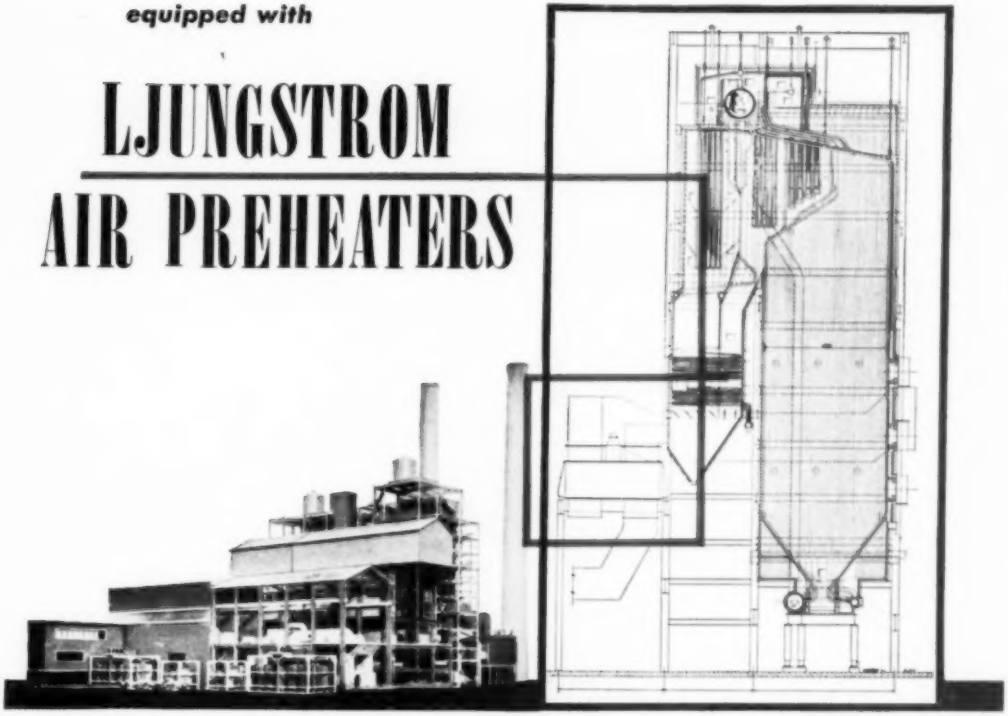
NATIONAL VALVE & MANUFACTURING COMPANY • PITTSBURGH, PA.

NEW YORK • CHICAGO • CLEVELAND • BOSTON • ATLANTA • TULSA • BUFFALO • CINCINNATI

Boilers at new Gadsby Steam Plant of the Utah Power & Light Company . . . .

equipped with

LJUNGSTROM AIR PREHEATERS



Utah Power & Light Company's new Gadsby Steam Plant, designed by Bechtel Corporation, will utilize, on completion, two Riley Steam Generating Units totalling 1,195,000 pounds of steam per hour capacity.

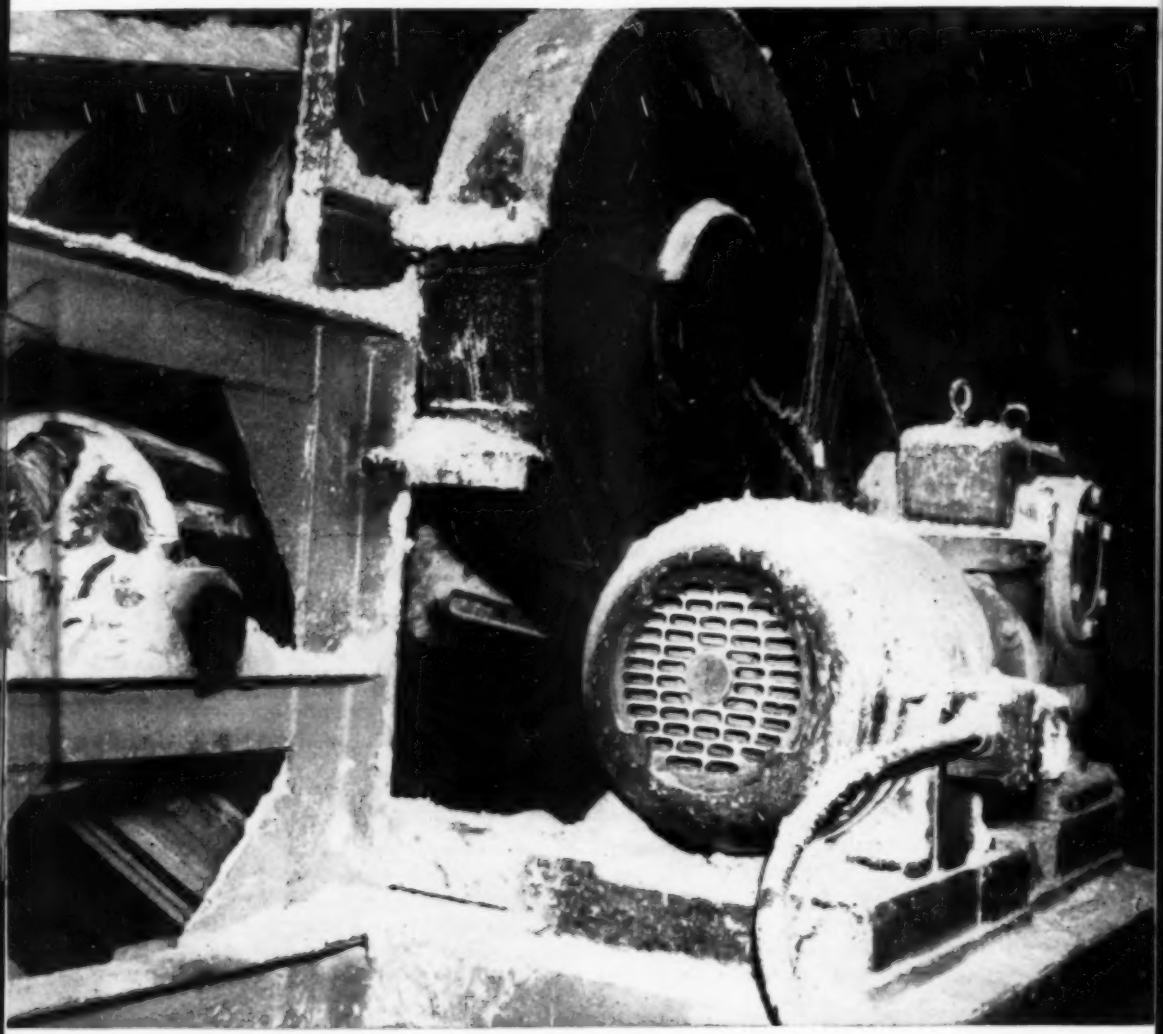
One unit, shown here, went on the line last August. Fired with petroleum pitch and designed for future pulverized coal firing, it generates 620,000 pounds of steam per hour at 1500 psi and 955 F. The second boiler is scheduled to begin operation late this year. Its capacity will be 575,000 pounds of steam per hour. This unit is designed for 1700 psi and 1000 F, with a reheat cycle at 396 psi and 1000 F. It will be fired with pulverized coal, and will have firing equipment for petroleum pitch.

Each of these modern steam generating units has been designed to incorporate a Ljungstrom Air Preheater. The Ljungstrom now in service preheats combustion air to 642 F, cools stack gases to 305 F. The Ljungstrom on the second unit will preheat air to 650 F, cool exit gas to 315 F.

This is another example of the unanimity with which boiler manufacturers have included Ljungstrom Air Preheaters in outstanding recent installations. The effectiveness and dependability of the Ljungstrom Air Preheater have made it a standard for high efficiency steam generating units.

THE Air Preheater Corporation 60 East 42nd St., New York 17, N. Y.

INDUSTRY DOES THE



THE CHEMICAL INDUSTRY depends on standard, "off the shelf," Tri-Clad motors in the most adverse operating conditions, including corrosive, abrasive and explosive atmospheres. The 7½-hp totally-enclosed fan-cooled Tri-Clad motor above drives a crude ash conveyor an average of over 23 hours every day.

GENERAL ELECTRIC

752-12

TOUGH JOBS WITH TRI-CLAD MOTORS

REG. U.S. PAT. OFF.

EXTRA PROTECTION

Every Tri-Clad motor, open or totally-enclosed, is triply-protected against *physical damage, electrical breakdown* and *operating wear and tear.*

That's why you'll find general-purpose Tri-Clad motors in every industry—not only on the usual jobs which they do so economically—but on the *tough* jobs where unfailing performance is a must.

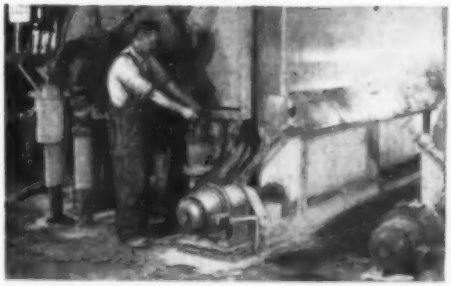
PROMPT DELIVERY

Today especially, delivery and service are important. G-E shipping points all over the country are ready to deliver most standard ratings right out of stock. And with the most complete service shop network in the motor industry you are assured of the best attention to motor problems.

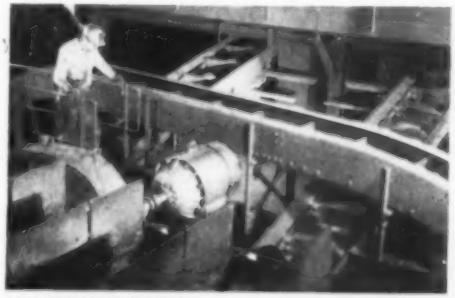
TIMELY INFORMATION AVAILABLE

If you are concerned with training manpower, the new G-E Motor Selection and Application Course, including nine strip films, is a unique and valuable aid. A sample copy of the "Instructor's Manual" (GEZ-310), which outlines the course, may be obtained on request.

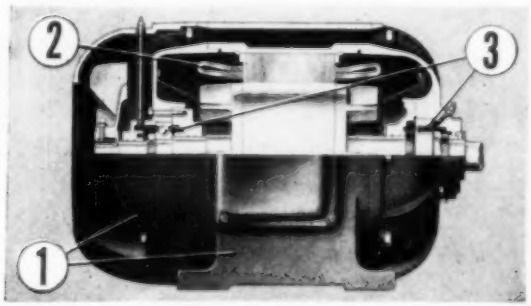
Also available is a free bulletin on "How to Maintain Motors and Generators" (GET-1202). Contact your local G-E sales office for any of the above material, or write *Section 752-12, General Electric Co., Schenectady 5, N. Y.*



FOOD PLANTS on "continuous process" operation depend on Tri-Clad motors to avoid costly shut-downs. Totally-enclosed, non-ventilated Tri-Clad gear-motor above drives a repulper in a sugar refinery.

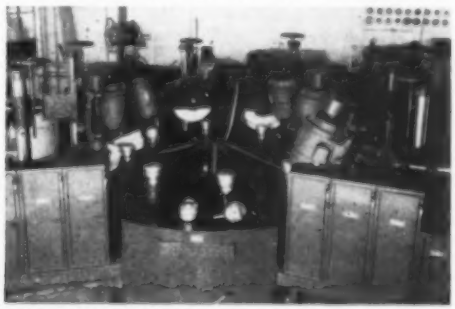


MINING INDUSTRIES know Tri-Clad motors can take abuse, don't twist out of line and are corrosion-resistant. This totally-enclosed, fan-cooled, Tri-Clad motor runs a coal conveyor.



UNINTERRUPTED SERVICE under tough conditions is assured by many outstanding features of Tri-Clad totally-enclosed motors, for example: 1 rigid, cast-iron end shields and frame; 2 Formex® windings which resist oil, heat, shock, moisture, abrasion; 3 completely enclosed bearings that will last longer because provision is made for relubrication if necessary.

Reg. trademark of General Electric Co.



METAL WORKING FIELD likes Tri-Clad motors because they're easy to mount in any position, rigid and smooth running, and can be relubricated if operating conditions warrant — without disassembly! Six 7½-hp TEFC Tri-Clad motors run machine above which polishes 500 to 1000 metal coffee-makers per hour!

"STARTING LOAD ON OUR 40 H. P. CRUSHER MOTOR CAUSED 400 AMP. ORDINARY FUSES TO BLOW . . . BUT NOW 125 AMP. FUSETRON FUSES LET MOTOR START AND GIVE BURNOUT PROTECTION TOO."

Mr. Meeka explains . . .

"We have a crusher driven by a 40 h.p. 250 volt motor. The starting load on this motor is often quite heavy and gave us no end of trouble by causing the 400 ampere fuses protecting the circuit to blow.

"Some months ago, after checking the actual running current of the motor with an ammeter, we decided to see if FUSETRON dual-element Fuses could live up to their claims.

"The ammeter reading indicated that 125 ampere FUSETRON Fuses should be used to give motor-running protection. So, we installed this size.

"Were we surprised—they not only hold the starting current of the crusher motor—but we have the satisfaction of knowing the motor also has burnout protection to back up the overload relays in case they should ever fail.

"Not once since we installed FUSETRON Fuses have we lost a moment's production due to a fuse blowing needlessly."

ED MEEKA
Supt., ROBINSON BRICK & TILE CO.
Denver, Colorado

FUSETRON
TRUSTWORTHY NAMES IN ELECTRICAL PROTECTION
BUSS

(FUSETRON is a trade mark of the Bussmann Mfg. Co., Division of McGraw Electric Co.)

"FUSETRON FUSES NOT ONLY ELIMINATE USELESS SHUTDOWNS - THEY GIVE YOU 10 POINT PROTECTION."

1 Protect against short-circuits.*

2 Protect against needless blows caused by harmless overloads.

3 Protect against needless blows caused by excessive heating—lesser resistance results in much cooler operation.

4 Provide thermal protection — for panels and switches against damage from heating due to poor contact.

5 Protect motors against burnout from overloading.

6 Protect motors against burnout due to single phasing.

7 Give DOUBLE burnout protection to large motors — without extra cost.

8 Make protection of small motors simple and inexpensive.

9 Protect against waste of space and money — permit use of proper size switches and panels

10 Protect coils, transformers and solenoids against burnout.

*Fusetron Fuses have high interrupting capacity as shown by tests of the Electrical Testing Laboratories of New York City in December 1947.

DON'T RISK LOSSES

One **needless** shutdown . . .
One **lost** motor . . .
One **destroyed** switch or panel
One **burned out** solenoid . . .

May cost you far more than replacing every ordinary fuse with a Fusetron dual-element Fuse.

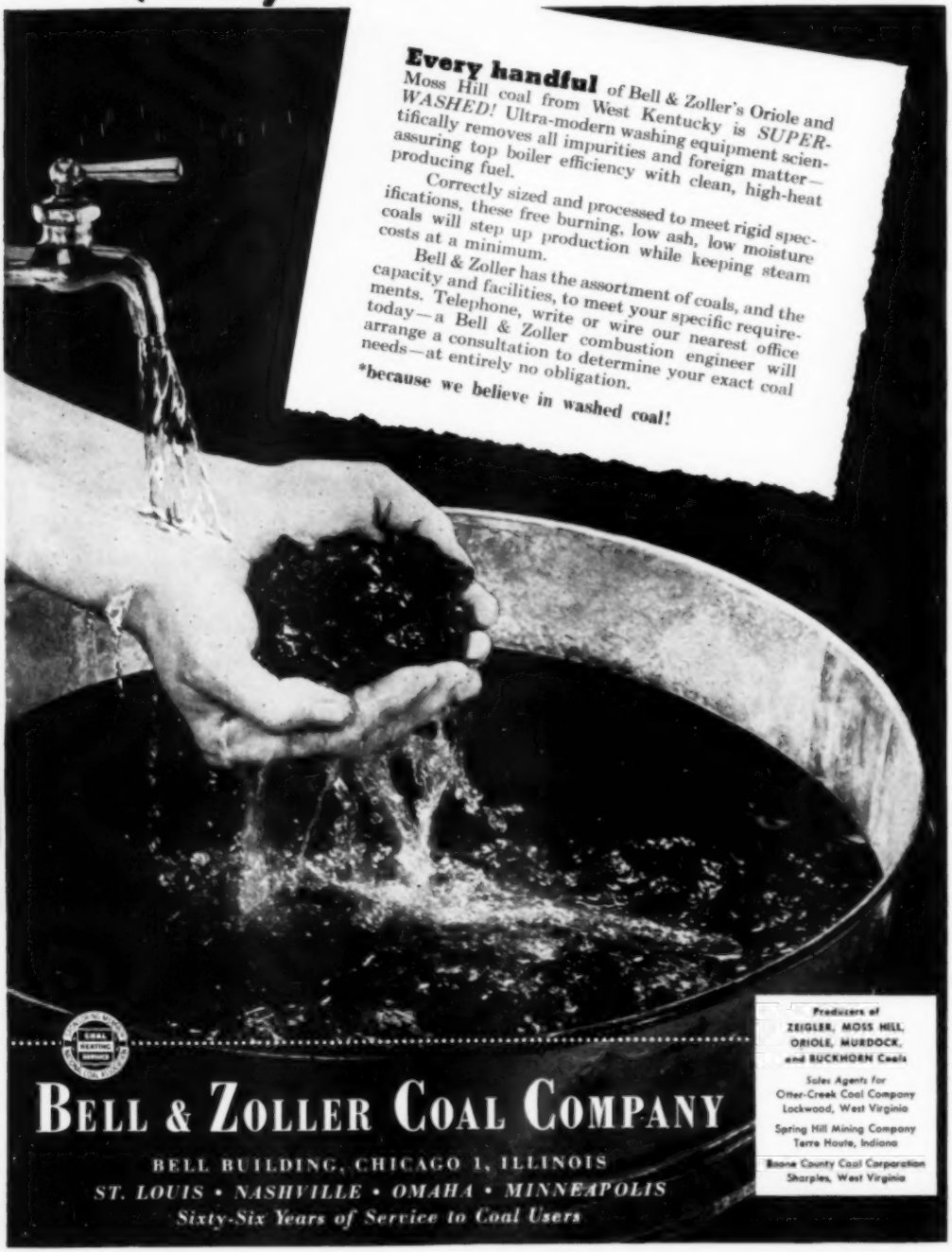
MAIL THE COUPON NOW
for complete information about the All-Purpose Protection of FUSETRON Dual-Element FUSES.

BUSSMANN Mfg. Co. (Division of McGraw Electric Co.)
University at Jefferson, St. Louis 7, Mo.

Please send me complete facts about FUSETRON dual-element Fuses.

*Name*_____
*Title*_____
*Company*_____
*Address*_____
*City & Zone*_____ *State*_____ 552

Every Day is WASH DAY* at Bell & Zoller!



Every handful of Bell & Zoller's Oriole and Moss Hill coal from West Kentucky is *SUPER-WASHED!* Ultra-modern washing equipment scientifically removes all impurities and foreign matter—assuring top boiler efficiency with clean, high-heat producing fuel.

Correctly sized and processed to meet rigid specifications, these free burning, low ash, low moisture coals will step up production while keeping steam costs at a minimum.

Bell & Zoller has the assortment of coals, and the capacity and facilities, to meet your specific requirements. Telephone, write or wire our nearest office today—a Bell & Zoller combustion engineer will arrange a consultation to determine your exact coal needs—at entirely no obligation.

***because we believe in washed coal!**

Producers of
ZEIGLER, MOSS HILL,
ORIOLE, MURDOCK,
and BUCKHORN Coals

Sales Agents for
Otter-Creek Coal Company
Lockwood, West Virginia

Spring Hill Mining Company
Terre Haute, Indiana

Boone County Coal Corporation
Sharples, West Virginia

BELL & ZOLLER COAL COMPANY

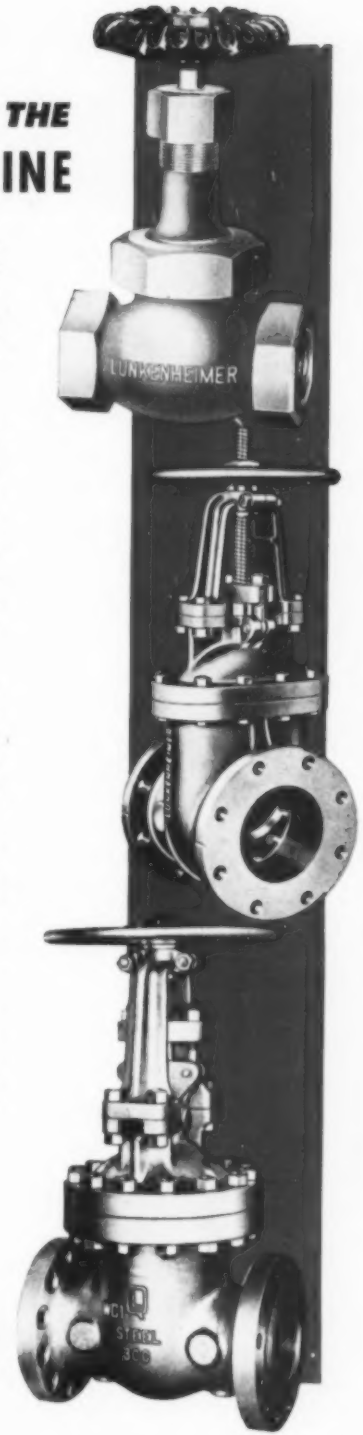
BELL BUILDING, CHICAGO 1, ILLINOIS

ST. LOUIS • NASHVILLE • OMAHA • MINNEAPOLIS

Sixty-Six Years of Service to Coal Users

YOU SAVE 5 WAYS

WHEN YOU ORDER VALVES FROM THE COMPLETE LUNKENHEIMER LINE



YOU SAVE IN INVENTORY — because Lunkenheimer Valves are gauged to such close tolerances that parts are readily interchangeable and replaceable. With a *few* Lunkenheimer Valves in stock, you have the assemblies required to meet many service conditions — with no delay for costly "tailoring" of parts.

1

YOU SAVE IN MAINTENANCE —because Lunkenheimer Valves are service-engineered for *particular* applications. They give you trouble-free performance in all the services for which they are recommended. And the Lunkenheimer line is *complete*.

2

YOU SAVE IN PRODUCTION — because you needn't worry about costly "down-time." Lunkenheimer Valves stay on the job — month in, month out. The finest alloys and outstanding craftsmanship assure you of long, trouble-free service.

3

YOU SAVE IN ORDERING — because the nation-wide network of Lunkenheimer "blue-chip" distributors gives you fast local service. You can fill *all* your needs from the complete Lunkenheimer line — save shipping costs . . . simplify your ordering and handling.

4

YOU SAVE IN FINAL COST — because Lunkenheimer Valves offer you unmatched quality in materials, design, and workmanship. Whether you need bronze, iron, or steel valves — in whatever size or pattern —you can count on dependable performance from the *complete* Lunkenheimer line.

5

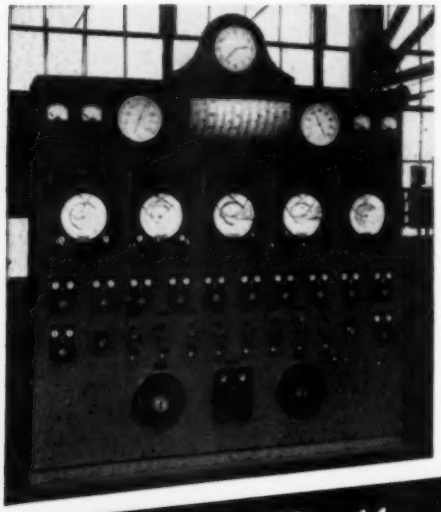
WRITE FOR literature on Lunkenheimer Bronze, Iron, or Steel Valves. Where possible, describe your typical valve applications. For quick local service, call your Lunkenheimer Distributor. The Lunkenheimer Co., Box 360EE, Cincinnati 14, Ohio.

BRONZE • IRON • STEEL

LUNKENHEIMER

THE ONE *Great* NAME IN VALVES

L-483-17



This Bailey Boiler Control Panel in a mid-western industrial plant saves fuel and insures safe operation of a 100,000 lb per hr, 175 psi, sat., pulverized coal and gas-fired boiler.

What's Your Control-Dollar Efficiency?

Control-dollars frequently bring annual investment returns of 100% or more. When you buy adequate, well-applied steam plant controls, you increase your dollars' ability to work usefully for you.

That's where Bailey can help: Bailey Controls can give you a better control-dollar efficiency. Here's why:

1. **Complete Range of Equipment—fully co-ordinated.** You need never worry that a Bailey Engineer's recommendation is slanted in favor of a particular type of equipment, just because he has a limited line to sell—or that Bailey will pass the buck for efficient control; we offer *complete* boiler control systems.

2. **Engineering Service—backed by experience.** No other manufacturer of instruments and controls can offer as broad an experience, based on successful installations involving all types of combustion, flow measurement and automatic control.

3. **Direct Sales-Service—conveniently located near you.** Bailey Meter Company's sales-service engineers are located in more industrial centers than those of any other manufacturer of boiler control systems; you get prompt, experienced service with a minimum of travel time and expense.

•

For better control-dollar efficiency—for more power per fuel dollar, less outage and safer working conditions, you owe it to yourself to investigate Bailey Controls. Ask a Bailey Engineer to arrange a visit to a nearby Bailey installation. We're proud to stand on our record: "More power to you!"

A-112-1

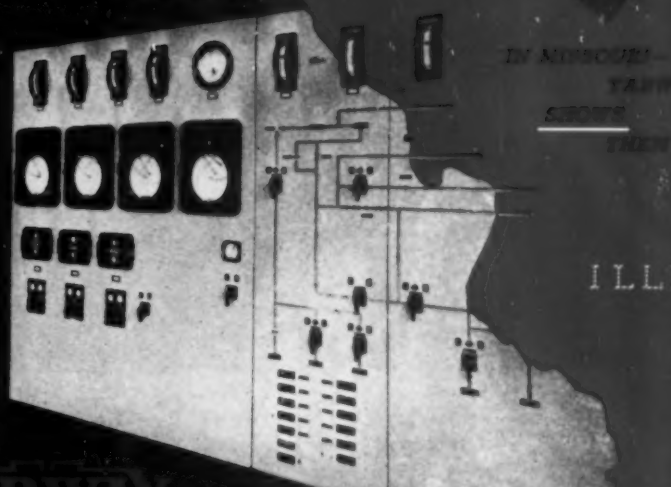
BAILEY METERS

BAILEY METER COMPANY

1028 IVANHOE ROAD
CLEVELAND 10, OHIO

Controls for Steam Plants
COMBUSTION · FEED WATER
TEMPERATURE · PRESSURE
LIQUID LEVEL · FEED PUMPS

The Empire District Electric Company orders and reorders...



Seven Yarway Remote Liquid Level Indicators on instrument panel at Riverton plant of The Empire District Electric Company. Each is equipped with control unit and remote Hi-Lo Alarms.

YARWAY

remote liquid level indicators

In Missouri
(as the saying goes)
you've got to show them your product is good.

Apparently The Empire District Electric Company at Joplin was shown. Not only are they satisfied with 8 Yarway Remote Liquid Level Indicators at the Riverton plant, they also plan to use 8 others in a new installation.

Yarway Remote Liquid Level Indicators bring readings down to convenient eye level. Accuracy is assured because the indicator is operated by the liquid itself ... by the pressure differential between a constant head and the varying head in the drum or tank. Indicating mechanism is never under pressure. There are no stuffing boxes.

New control unit permits operation of additional Hi-Lo Alarms (light or horn) at any remote locations.

See Yarway Indicator Bulletin No. WG-1823 or Bulletin No. WG-1830 for the Yarway Indicator-Recorder.

YARWAY SERVICE GOES ALL THE WAY...

YARNALL-WARING COMPANY

Home Office:
100 Mermaid Ave., Philadelphia 18, Pa.

Sales Representatives:
GEORGE A. HARVEY, Bona Allen Building, Atlanta 3, Ga.

You might reasonably suppose swimming and picnic time would find our powerful compressor stations just loafing along in tune with the lazy days.

Certainly homes have little need of high B.T.U. natural gas heating when the thermometer reaches for the hundred mark.

And time was on our pipe line when summer deliveries were way down.

But things are different now. Industry has learned how excellent and reasonably priced a fuel or raw material natural gas is.

More and more buildings, too, are turning to natural gas air conditioning and in many a home there's a handsome new gas refrigerator.

So now summer deliveries from our lines in Mississippi, Alabama and Georgia run around 75 per cent of the winter load and sometimes even higher.

Of course when we say "no vacation" we're guilty of a bit of exaggeration. For the somewhat smaller summer load lets us overhaul our equipment, putting it in top shape for winter's peak deliveries.

Nor does the "no vacation" description apply to Southern Natural people. Paid vacations of two weeks (three weeks for the old-timers) give Southern Natural men and women that fresh outlook which helps them serve you better.

The point we'd like to make is that natural gas is doing a big job, not only day and night but winter and summer too.

Perhaps there's a thought here for you.

Watts Building

MISSISSIPPI GEORGIA ALABAMA LOUISIANA • TEXAS

Southern Natural Gas Company

Birmingham Alabama

TNEMEC PRIMERS KILL RUST!

SMALL amounts of moisture will inevitably penetrate any paint film, causing rust and corrosion . . . but TNEMEC *uses* this moisture to destroy rust at its source!

TNEMEC PIGMENT is a compound which includes and intensifies the preservative properties of Portland cement. Combined with moisture, it creates a neutral condition on steel surfaces, changing active rust and corrosive agents into an inactive neutral compound.

That's the amazingly simple process that makes TNEMEC so outstandingly successful as a prime coat on steel. We invite you to investigate the performance of TNEMEC Primers on any type of installation . . . for adhesion, waterproofness and durability . . . under the most severe conditions. Its record as a long-lasting, anti-corrosive coating is unique.

Ask Any TNEMEC User
(TEE-NEE-MIK)

SEE OUR CATALOG IN SWEET'S

MAIL THIS COUPON FOR YOUR COPY OF TNEMEC CATALOG 50

TNEMEC COMPANY, INC.

TNEMEC COMPANY, INC.
131 W. 23rd Ave., North Kansas City, Missouri

Gentlemen:
Send my copy of your Catalog 50 to:

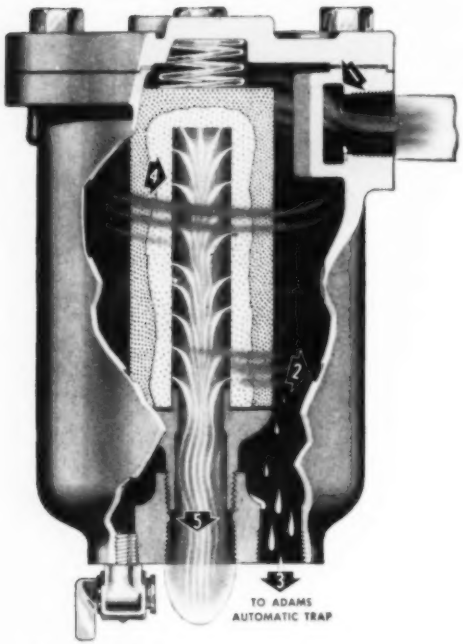
NAME _____

FIRM NAME _____

ADDRESS _____

CITY _____ ZONE ___ STATE _____

ADAMS *has both* *



—— BOTH ANSWERS TO THE PROBLEM OF KEEPING WATER, WATER VAPOR, OIL AND DIRT OUT OF COMPRESSED AIR LINES

There's no *one* answer to this problem! The most expensive aftercooler you can buy will not remove scale that is picked up in the distribution lines. The most expensive air filter you can buy cannot guarantee removal of water vapor until it has been condensed by cooling. That's why Adams makes both.

* PORO-STONE *AIR FILTER*

1. Centrifugal separation of dirt and liquids.
2. Drainage to trap directed by vertical cast-in slots.
3. Continuous, fully automatic trap action.
4. Rapid diffusion and filtration through permanent, cleanable Poro-Stone.
5. Clean, dry air at practically unchanged pressure. Standard, stocked sizes handle from 10 to 700 cfm.

Easily installed in either vertical or horizontal pipe line.

* *AFTERCOOLER AND CYCLONE SEPARATOR*

Cools air to within a few degrees of cooling water, making certain that compressed air is colder than surrounding atmosphere, so that no further condensation can take place.

Counter flow, air-through-tube design assures continuously high heat transfer rate.

Double cyclonic action deposits all water and entrained oil in moisture chamber.

R. P. ADAMS CO., INC.
247 E. Park Drive, Buffalo 17, New York

Please send me your latest literature, Bulletin No. 176 on BOTH the Poro-Stone air filter and the Adams Aftercooler — Cyclone Separator.

Name .....

Company ..... *Title* .....

Address .....

City ..... *State* .....

FOR YOUR PROFIT'S SAKE — FIND OUT ABOUT BOTH

R. P. ADAMS CO., INC., BUFFALO 17, N. Y.

COST SAVING!

Bunting's 854 sizes of Standard Stock Bearings fit machine tools and industrial machinery of all kinds and are most economical to purchase whether your quantities be large or small.

Bunting's 324 sizes of Bronze Electric Motor Bearings fit practically all popular sizes and makes of motors.

Bunting's 263 sizes of Precision Bronze Bars save 50% machining time and 25% purchased metal as compared with rough cast bars.

Bunting Ads won 1st award in contest sponsored by Industrial Distributors Associations.

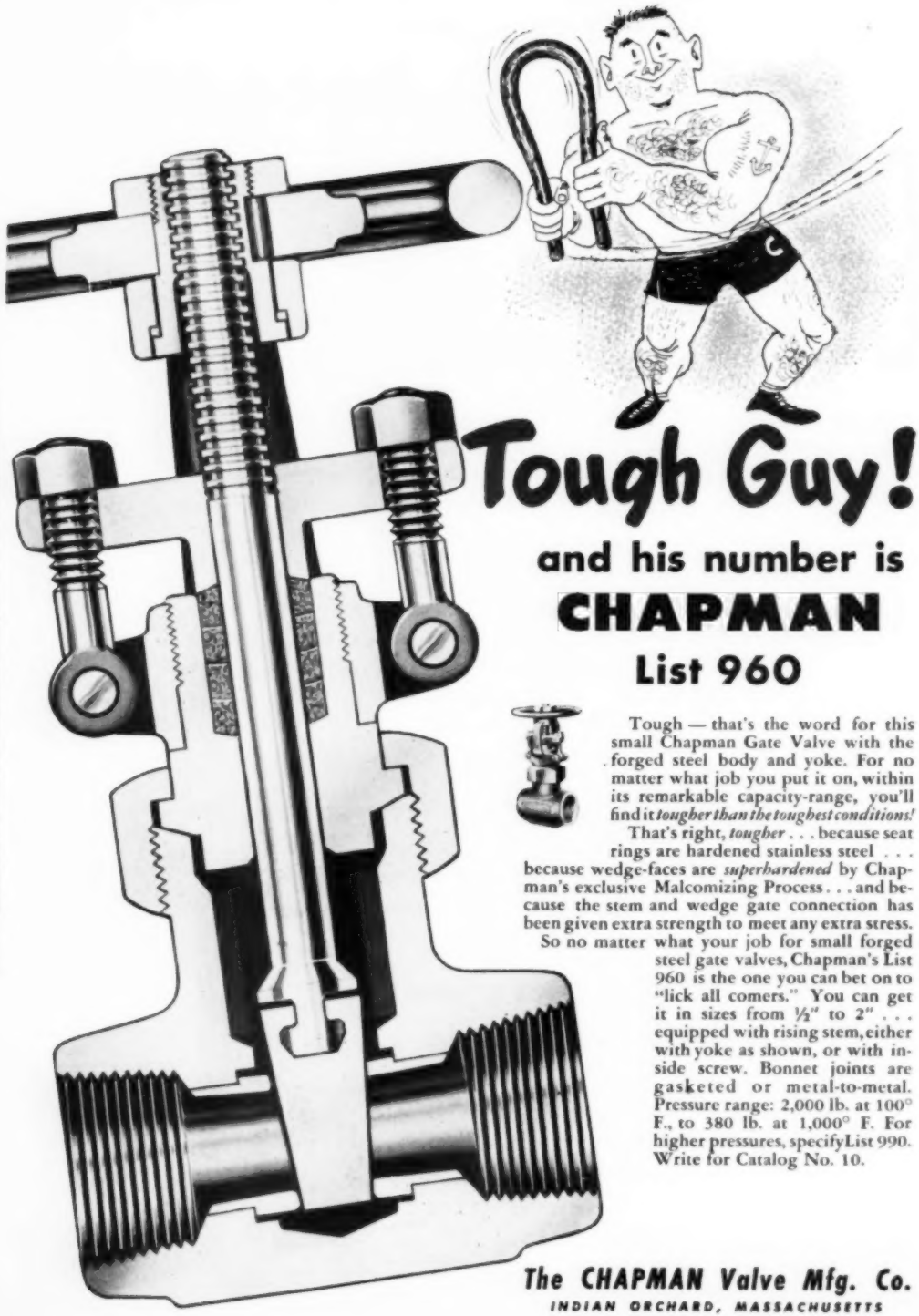
Bunting®

BRONZE BEARINGS • PRECISION BRONZE BARS • BUSHINGS

...IN STOCK EVERYWHERE

Bunting products are instantly available in all markets, from the stocks of leading industrial distributors and distributors of specialized industrial items. Ask your distributor or write for catalog.

THE BUNTING BRASS & BRONZE COMPANY • TOLEDO 1, OHIO • BRANCHES IN PRINCIPAL CITIES



Tough Guy!

and his number is CHAPMAN List 960

Tough — that's the word for this small Chapman Gate Valve with the forged steel body and yoke. For no matter what job you put it on, within its remarkable capacity-range, you'll find it *tougher than the toughest conditions!*

That's right, *tougher* . . . because seat rings are hardened stainless steel . . . because wedge-faces are *superhardened* by Chapman's exclusive Malcomizing Process . . . and because the stem and wedge gate connection has been given extra strength to meet any extra stress.

So no matter what your job for small forged steel gate valves, Chapman's List 960 is the one you can bet on to "lick all comers." You can get it in sizes from ½" to 2" . . . equipped with rising stem, either with yoke as shown, or with inside screw. Bonnet joints are gasketed or metal-to-metal. Pressure range: 2,000 lb. at 100° F., to 380 lb. at 1,000° F. For higher pressures, specify List 990. Write for Catalog No. 10.

The CHAPMAN Valve Mfg. Co.
INDIAN ORCHARD, MASSACHUSETTS

Timely Comments

Check the Answers to Five Economic Facts Widely Misunderstood

ADDRESSING 175 members and guests of the Electrical Association of New Orleans, *Edwin Vennard*, Vice President of the *Middle West Service Co.*, emphasized the need for plant managers and their employees to obtain a better understanding of the simple economic facts that underlie our economy. Ignorance of economic facts tends to be associated with a willingness to believe in and support the doctrine of reliance upon government for solution of personal economic problems.

There are only two kinds of government: the kind where the government runs the people, and the kind where the people run the government. The history of the American Republic is the best example in all history of man's ability to improve himself when government leaves him alone.

The support of increasing government domination is based upon ignorance of simple economic facts. The particular economic facts which are most widely misunderstood include:

The size and rate of profits. People think the average business profit is about 25 per cent. They think that 10 per cent is a fair profit. They don't know that for the last twenty years in America the actual profit of manufacturing concerns has been from 4 cents to 6 cents on the dollar of sales. Because people do not know this, they get angry with business and clamor for the government to take it over because they think the owners are making too much.

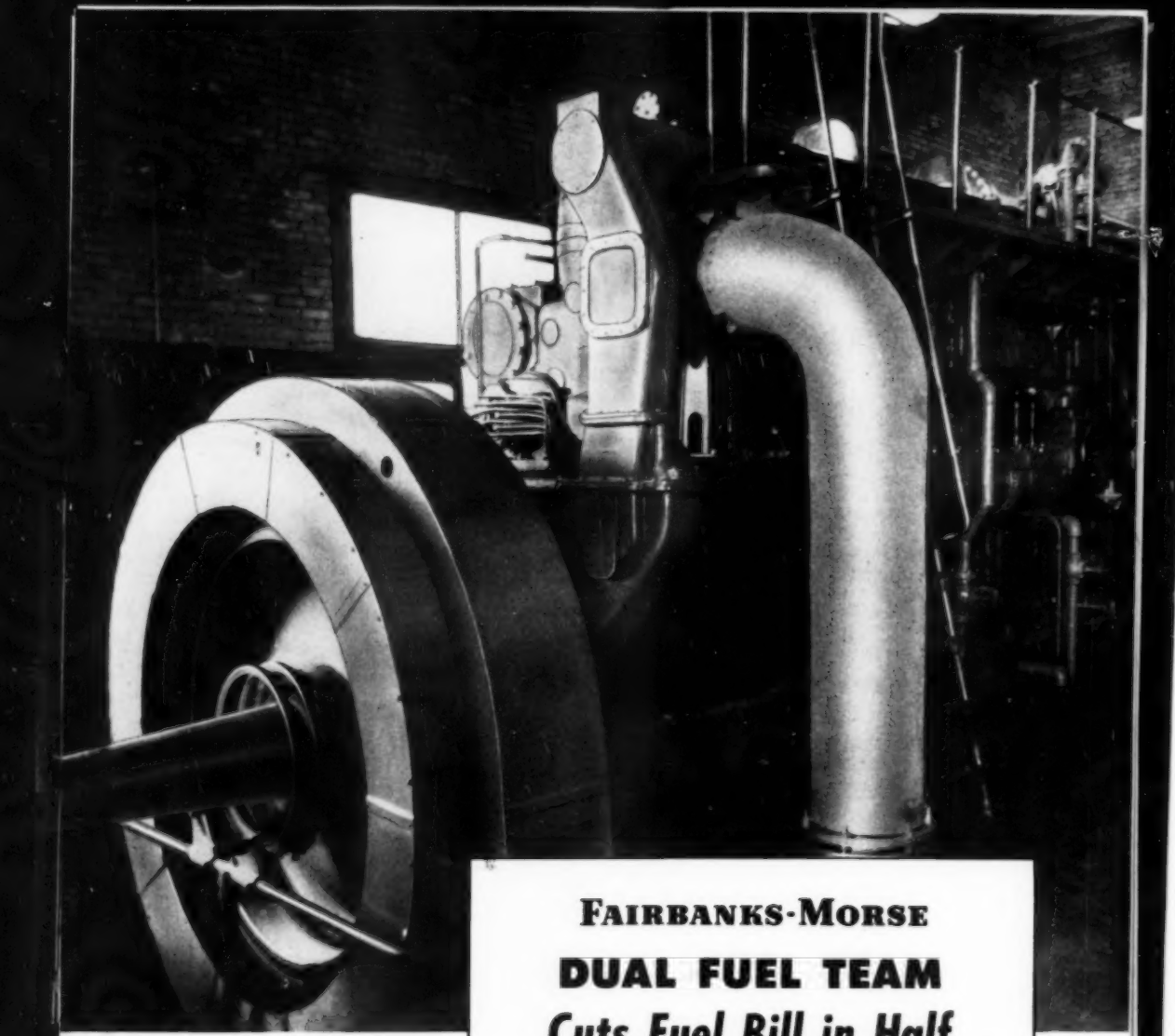
The way income in a business is divided between employees and the owners. Many factory employees think that the owners get about 75 cents for every 25 cents the employees get. The record in all manufacturing industries in the United States for the last 20 years is that the employees got 80 cents for every 20 cents the owners got. Because people do not understand this fact some of them cry for the government to take over business in order to give the working man a "more equitable division."

The effect of machines upon employment. Many people do not know that machines now do 94 per cent of all the work that is done in America. They don't know that because of machines every American factory worker has the equivalent of 142 coolies working for him. They don't know that machines make jobs in the long run. They don't know that the only way workers can get more real income is to produce more with the help of more and better machines.

The importance of incentive in a free society. They don't understand that it is the selfish desire of everyone to improve his own condition that causes people to invent new and better ways of doing things and make new and better products.

The distribution of income in America. They don't know that 65 per cent of all the national income is paid to employees in wages and salaries. Only 4 per cent goes to stockholders. They don't know that after income taxes about 90 per cent of all the income left is in the hands of people who have incomes of less than $100 per week. Because they don't know these facts they believe someone who says he can make them rich by taking it away from the rich people.

The Declaration of Independence rests upon a foundation of Christian belief. The first sentence declares a belief in God, who created all men equal. It declares that men were endowed by their Creator with certain unalienable rights which do not come from the government but come from the Creator. The Declaration of Independence says the **only reason for government** is to make sure that these unalienable rights are not violated.



FAIRBANKS-MORSE
DUAL FUEL TEAM
Cuts Fuel Bill in Half

Here at Benton, Arkansas, is the leader of the Fairbanks-Morse dual fuel team that cuts this municipality's fuel bill in half . . . saving $36,000 annually.

Installed as a dual fuel unit, this 2000 hp. Model 33 started plant conversion to full gas operation. Two other Fairbanks-Morse diesels were equipped with dual fuel accessories, and now the 4200 hp. team carries the entire load . . . at the low cost of only 3.36 mills per kw-h. All three engines can operate on gas or switch instantly to full diesels without dropping the load.

On standby duty are three more Fairbanks-Morse diesels, completing the team that assures this community low-cost, dependable power. Fairbanks, Morse & Co., Chicago 5, Illinois.

Put Your Power Costs in Order with Fairbanks-Morse Dual Fuel Economies.

FAIRBANKS-MORSE,

a name worth remembering

DIESEL AND DUAL FUEL ENGINES • DIESEL LOCOMOTIVES • ELECTRICAL MACHINERY • PUMPS • SCALES • RAIL CARS • HOME WATER SERVICE EQUIPMENT • FARM MACHINERY • MAGNETOS

Industry Speaks

TIMESTUDY-INCENTIVE—a combination that measures capability and rewards performance

Adapted from comments by *Phil Carroll*, Consulting Industrial Engineer, before a meeting of the *Society for the Advancement of Management* held at the Georgia Institute of Technology in *Atlanta, Georgia*. Mr. Carroll is the author of *Timestudy for Cost Control*, *Timestudy Fundamentals for Foremen*, and *How to Chart Timestudy Data*.

INDUSTRY NEEDS PROFITS because it pays the bills. It pays taxes, provides job security for the employees, pays the investors a fair return on their capital, and provides the necessary capital to continue the successful operation of the industry.

Your plant makes a profit in two places—before you get the order (selling your products at the right prices) and after you get the order (controlling costs).

There is almost no part of cost reduction where timestudy cannot be used with advantage. It is very useful whether your goal is to reduce costs or to increase production. The important difference between these two is in the proration of overhead. When you are expanding, increases in production can save the purchase of more plant and equipment. The effect on cost can be substantial.

To improve production, timestudy uncovers leaks. It shows up the waiting time, the wasted and unnecessary work. End results are usually work standards, and most people use them in connection with wage incentives. Incentives are necessary to get the results. If you use work standards without incentives, you get what we call "a fair day's work." With incentives you get more output from a given size of plant.

The driving force behind our productivity is the wants of the average American family. The plant manager, the employee, and the housewife have a common interest in maintaining higher living standards. This acts as a fly-wheel on productivity. The stabilizing effect of this fly-wheel is vital in estimating the prospects of success with a new product. It is essential in predicting the results from new methods and better process equipment.

The work standards resulting from the timestudy mentioned above are only part of the results desired. It is very important to know that those who work on standards will probably maintain their incentive performances. When you have this condition present, you can make many of your plans come true.

But, we cannot have more pie unless we increase the size of the pie. This means increasing production and lowering prices relatively. We can't get any place paying more money for the same production. We need better controls and better methods.

Don't limit your approach to the so-called direct labor. **Overhead or indirect costs is a virtually untapped gold mine.** We often don't know what work is supposed to be done and don't have any count on the work that is done. We would be in a bad fix in the shop if the customer didn't tell us what the count was. He tells us how many pieces to make.

Can you control indirect expense by means of budgets? How are they set? Can a department head measure himself correctly? Won't he be inclined to add amounts for contingencies? What kind of a yardstick does he have for measuring his experience? Only past experience—including poor performance, optional trimmings, and useless details.

Why not put incentives on direct labor? You can use timestudy standards to get reliable measures. You need this more for the indirect than the direct. Remember, you have a much better measure of product output. You know much more specifically what work is done in the shop.

You need measures of indirect labor to give you another direction finder. They help you assign the correct overhead costs by products. You can find out where the profits and losses are. Most of your costs are wrong. You figure direct labor and material to the fourth decimal place. Then you spread on the overhead with a shovel. Get the overhead cost applied correctly. Measure the indirect work that is done for each of the products. Then apply incentives to control costs.

Your employees are not interested in production when they cannot tell if they will have a job tomorrow. If morale is low, your costs are high. You need the interest of your employees. Your employees are the only people who can save wasted time and effort.

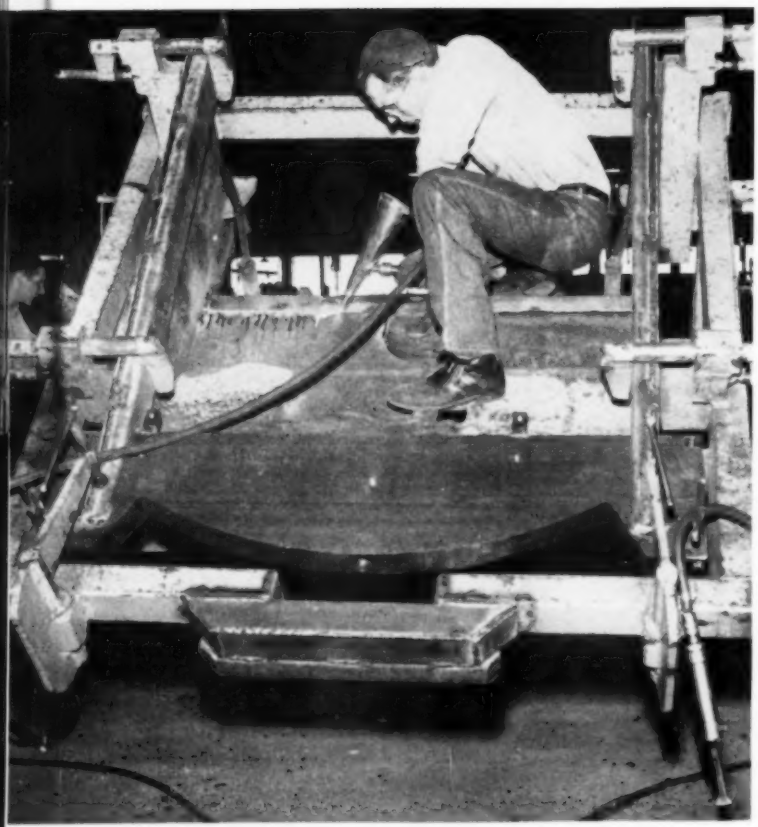
Incentive is the key to successful operations. We need more good leadership in order to develop the best there is in people. Are your leaders good or poor? Are they capable or incapable? Do they know what their jobs are? Are they pointed to the goals of successful plant operation? If we are going to develop men, we need definitions of the work to be done—measurements of work, reports on the results and incentives to do better.

PLANT TESTED PRODUCTION TECHNIQUE—

"SQUIRT" WELDING

at the Texas plant of R. G. LeTourneau

By PAUL BROADSTONE
Production Engineering Supervisor
R. G. LeTourneau, Inc., Longview, Texas



Welding is started (above left) by tipping the gun and positioning it approximately perpendicular to the work. A mound of flux is allowed to form and the electrode is touched to the work by scratching through the flux—as though striking a match.

This is the tail section of a Tournadozer, one of the several types of earthmoving and construction equipment manufactured in the R. G. LeTourneau, Longview, Texas, plant. The actual welding operation is well illustrated.

Note the single cable containing the electrode and carrying the necessary current. The gun is feeding the flux along the seam. Note that there is no flash or indication of an arc, as it is completely submerged. The black "drippings" running down from the completed portion of the weld is the flux, which has melted due to its adjacency to the arc. These drippings indicate a good weld.

After completion of the seam, the air chisel in the right foreground is used to knock off the slag and surplus flux to expose a clean weld. The fine gray material is surplus flux which has run off from the weld. This is reclaimed and mixed two parts reclaimed to one part new flux and is reused. Two way positioning jig of welded construction was designed and fabricated in the LeTourneau jig department.

Don Whiteside, Instructor and Welding Process Engineer, is standing at the left of the welding jig.

Squirt welding combines the flexibility of hand operation with the smoother, cleaner welds produced by hidden welding processes. Average savings in this Texas plant have been more than 30 per cent over former hand welding techniques.

THIS semi-automatic arc welding process, referred to as "Squirt" welding, is used extensively in our Longview, Texas, plant in the production of many types of earthmoving and construction equipment. Our average savings have been more than 30 per cent over the hand operation formerly used.

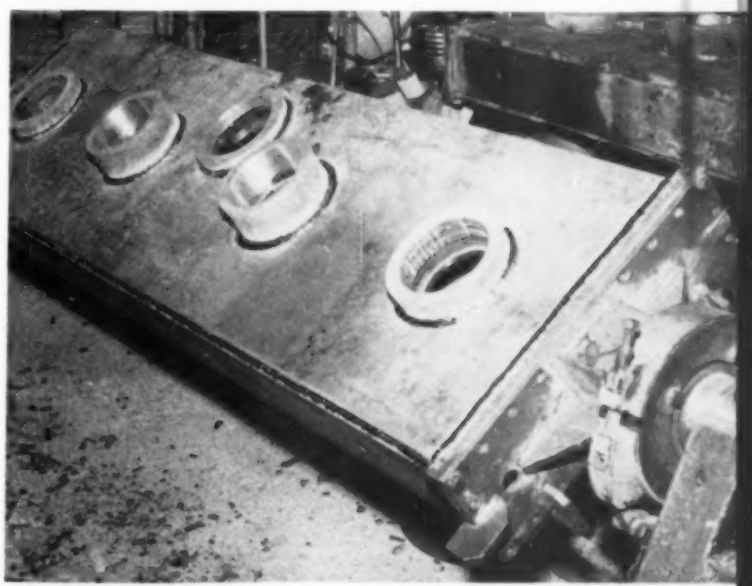
The process combines the flexibility of hand operation with the smoother cleaner welds produced by hidden welding processes. Granular flux deep enough to cover the completed weld is deposited on the joint to be welded. Bare metallic welding electrode is power-fed into the blanket of flux, its rate of feed controlled automatically for proper arc length.

Current, supplied by a squirt welder, produces the arc between the electrode and parent metal, producing the weld. Flux adjacent to the arc, melts and floats on the surface of the molten metal, then solidifies as a slag on top of the weld. Since the arc and molten metal are blanketed by flux at all times, the weld metal is completely protected from contact with the air, assuring maximum quality of welds and making possible the use of extremely high amperage for faster welding.

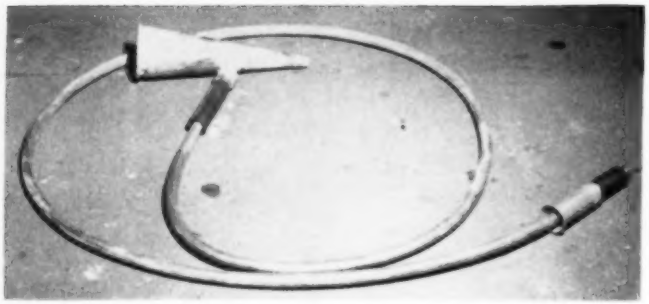
Welding equipment consists of a standard make or model welding generator with a "Squirt" control case added in the way of modification. A conductor cable carries the welding current and the electrode from the control case to the welding gun. The cable consists of a closely wound coiled steel spring over which concentrically is placed stranded copper wire. Molded rubber on the outside completes the compact, flexible conductor for both electrode and current.

Close-up of the diaphragm backing plate for a steering clutch shown being welded at the top of the opposite page. Squirted time was 5.4 minutes, compared with 7.8 minutes for old type manual welding—a savings of 31 per cent.

In a special control case is the electrode feed mechanism, which



One of two final driving gear housings. All the welds have been "squirted" and cleaned. Note the absence of craters and blemishes. Welds around the hubs were put in at a fillet position; shorter welds were a butt position; and the longer ones in a flat position. It previously required 21.8 minutes to weld the 83 in. of the long weld. Job can now be done with the squirt welding technique in 13.6 minutes—only 62 per cent of the previous time.



This is the welding gun and cable assembly. Note the flexibility of the cable — the core is a closely wound coiled steel spring over which concentrically is placed stranded copper wire. Molded rubber on the outside completes the compact, flexible conductor. The continuous wire electrode advances through the center opening and the current is carried by the stranded copper wire.

automatically feeds, at a pre-set proper arc voltage, a small diameter wire from the wire reel case through the conductor cable to the welding gun.

The gun or holder, attached to the cable, is in reality a small flux hopper. The tip of this gun is replaceable as is the cone itself.

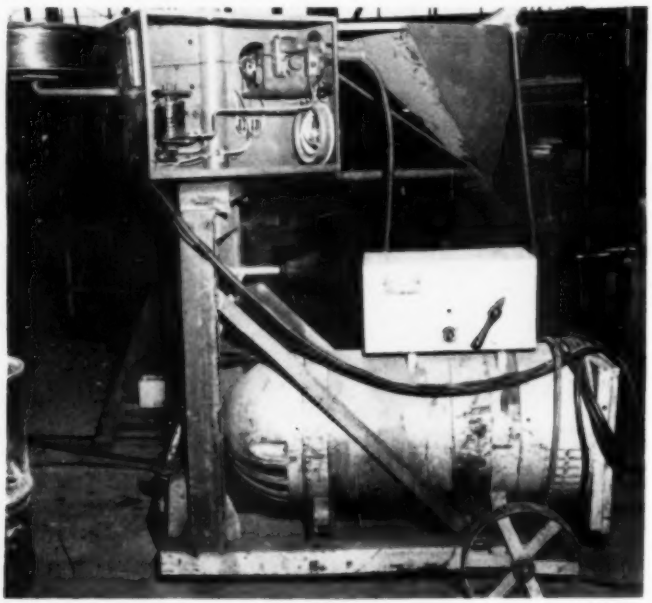
Welding Operation

In order to strike the arc the wire end must be clean and stick out approximately ½ in. from the gun tip. The work at the point of striking must be clean and properly grounded. Welding is started by tipping the gun and positioning it approximately perpendicular to the work, allowing a mound of flux to form and then, as though striking a match, touching the electrode to the work by scratching through the flux.

In the process, the wire is automatically fed to the work while correct arc voltage is maintained by the setting of the arc voltage control rheostat. This is independent of the height of the gun above the work. A practical check for correct voltage and operation is the appearance of the weld surface and the sound of the arc. The arc sound is similar to the sound of eggs frying with no sharp or loud crackling noises. The surface of the weld is clean and free from pinholes when properly produced.

As the seam is finished, the gun is quickly lifted from the work into a position which prevents the flux from flowing. The small cone on the gun is then refilled by touching it to a pressure relief gate on the bottom of the large flux container attached to the squirt mechanism.

We have found that the confinement of the arc within the flux blanket has minimized spatter and reduced "weld berries" to such an extent that cleaning expense has been cut to practically nothing. This arc confinement has eased the burden of the operator because the air is free of arc rays and smoke, making possible the substitution of dark glasses for the conventional welder's helmet. The welder no longer needs to keep a supply of old



This is a conventional welding machine with the "Squirt" welding case containing the "Squirt Weld" mechanism. The large reel on the side contains a 60 lb coil of squirt electrode or wire. This will last for 8 to 10 hours, depending on the size of weld to be made.

The box in the center is the electronic mechanism and the pyramidical hopper contains a large supply of granular flux. The small cone shaped gun hanging on the pyramid holds 2½ oz of flux and is refillable by pushing against the trip mechanism at the bottom of the flux hopper.

"Squirt" welding equipment at the R. G. LeTourneau, Longview, Texas, plant consists of three basic types of machines, of conventional model and manufacture, modified by addition of a "Squirt" control case. The Lincoln Electric Company worked very closely with the Longview, Texas, engineering staff in perfecting the process and the design of the squirt conversion kit, flux hoppers and cones.

Production Benefits of the Squirt Welding Technique

1. Spatter is minimized because the arc is submerged in the flux.
2. It is not necessary to wear the conventional type welding helmet as dark glasses are sufficient to prevent arc burn of the eyes.
3. The air is free of smoke and arc rays, thereby giving more comfort to operators.
4. No rod pots or other cumbersome rod holding devices are necessary because the electrode is contained in a 20 lb roll which lasts through several hours of welding.
5. Advantages of manual flexibility are combined with the clean, smooth seams that are characteristic of the hidden arc processes.
6. Appearance of a continuous jointless weld is superior to those in which rod changes make craters and joints.
7. Speed of the operation results in inherent savings.
8. High amperages are usable because protection from external conditions assures optimum quality and maximum speeds in welding.

type welding rods near his work, but may after several hours of continuous welding, simply load a new coil of wire into the case. The latter operation requires a little over 3 minutes.

Operating Difficulties

Should pinholes, which are the biggest bugaboo to "Squirt," develop, they are probably caused by either oily flux, wet or moist flux, oily electrode, rusty electrode, rusty or dirty work, bad ground connections, improper machine setting or arc blow.

Methodical checking item by item and applying the remedy will eliminate all of the troublesome pinholes.

Oily, wet, or moist flux may be remedied by heating at a moderate temperature for several hours to drive off the moisture. Oily or rusty electrodes or work should be cleaned by a solvent. Bad ground connection can be remedied by tightening the ground clamp.

There are several highly technical reasons for arc blow, but it can usually be eliminated by one of the following: (1) Make as much of the welding fixture as possible from non-magnetic material; (2) Keep steel parts far enough from the work and the arc so that very little detrimental magnetic flux will cross the gap to be welded; and (3) Start welding at the grounded end.

Production Benefits

Several of the important production benefits of the "Squirt" welding technique as employed by LeTourneau in Longview, Texas, are tabulated. Speed of the operation and inherent savings are probably of prime interest to other plants throughout the South and Southwest. Our average savings have been more than 30 per cent over the former hand welding method. Here are a few production examples:

Head Lamp—Squirt Time, 21.1; Previous Time, 44.0; Saved 22.9 minutes, or 52 per cent.

Sheave Housing—Squirt Time, 4.5; Previous Time, 6.7; Saved 2.2 minutes, or 33 per cent.

Panel Cover—Squirt Time, 12.0; Previous Time, 19.3; Saved 7.3 minutes, or 38 per cent.

Diaphragm Backing Plate—Squirt Time, 5.4; Previous Time, 7.8; Saved 2.4 minutes, or 31 per cent.

Rotating Digesters Cook Cotton Seed Pulp in Memphis Plant for Making Rayon and Plastics

Here's a new use for rotating digesters—to turn cotton seed linters into pulp for rayon and plastics at the Memphis plant of the *Buckeye Cotton Oil Company*, subsidiary of Procter and Gamble. The six vessels, similar to the type employed in pulp mills, were designed by *The Babcock & Wilcox Company*.

Each digester is designed to operate at a pressure of 165 psi at temperatures up to 350 F. They are 32½ ft long, with inside diameter of 11 ft. Charging nozzle is 2 ft in diameter. Pulp discharge end of the vessel is a 90 degree included-angle cone. Cooked pulp is removed through a bottom blow nozzle 8 in. in diameter. Digester rotates end over end one revolution every four minutes. Cotton seed linters in a caustic solution are "cooked" with steam as the vessel rotates.

Total weight of each vessel plus contents, 100 tons, is supported through two trunnions resting in heavy water-cooled bearings. The 16 in. diameter trunnions are welded into a heavy center reinforcing section. The latter, 4¾ in. thick, extending around the entire circumference of the digester, provides a means for distributing what would otherwise be highly concentrated stresses, over a large area of the vessel.

Each digester has a complete drive system, specifically designed for the requirements of this operation. Drive consists of a large ring gear mounted on one trunnion extension, driven by a forged worm gear on an integral shaft. Each unit is driven by a 50 hp motor through a suitable speed reducer and coupling. Drive mechanism is capable of taking the greatly increased torque created by the shifting center of gravity when the digester is partially full. At maximum condition this torque amounts to 540,900 ft lb, with an end thrust of 118,000 lb.

One dust collector ventilates battery plate cutting machine, a conveyor housing, and a refining kettle.

DUST AND FUME CONTROL
at Willard Battery, Memphis, Tennessee

BATTERY PLATE CUTTING MACHINE at the Willard Storage Battery Co. plant in Memphis, Tennessee. Note both the overhead hood and the duct work to the under-floor pit where high air velocities are maintained to assure an efficient job of dust collection. Scrap pieces are accumulated in the under-floor pit.

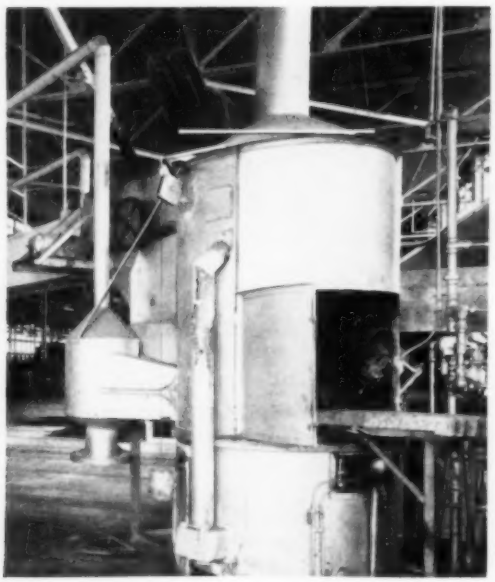
LEAD OXIDE DUST and fume have ceased to be problems for the Willard Storage Battery Company's Memphis, Tennessee, plant. One American Wheelabrator & Equipment Corp. collector with a cloth area of 2115 sq ft (in the form of 216 tubes) handles all the air required to ventilate a battery plate cutting machine, conveyor housing, and a refining kettle.

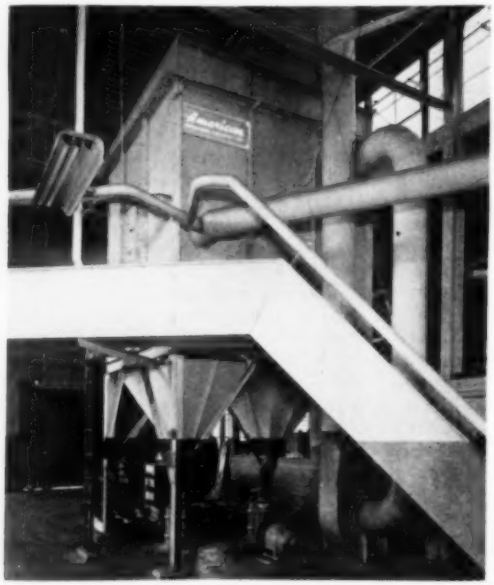
When the plates are cut on the machine, the scrap falls into a pit under the floor, from where it is conveyed to the refining kettle. There, it is re-melted with pig lead for use in other molding operations.

Air passing through the hoods and pit is kept at high velocity in order to collect all of the dust generated at the plate cutting machine. The conveyor is totally enclosed and ventilated by ducts. The hooding, duct work, and conveyor were

REFINING KETTLE with hood enclosure around the CONVEYOR DISCHARGE is shown at the left. Note small attached exhausting hood for dross collection. Scrap and pig lead are re-melted in this kettle in preparation for use in molding operations. Stack on the top of the refining kettle carries no lead-oxide fume, but rather, removes to the atmosphere the combustion products from the gas-fired heating unit underneath the refining pot.

THE DUSTUBE DUST COLLECTOR of the American Wheelabrator & Equipment Corp. ventilates all three operations in the manufacture of storage batteries. Conveyor housing is shown in the foreground together with duct work which ventilates it. Dust is emptied out of the hoppers through tight cylindrical canvas tubes which are clamped to the cylindrical parts of the hoppers. Collector is equipped with 2115 sq ft of cotton sateen cloth in the form of tubes.





excellently designed by Willard's engineers. An attached hood for dross collection at the refining kettle traps the lead oxide fumes given off there. Hood on conveyor discharge also ventilates the refining kettle.

The cloth is in the form of cotton sateen tubes. At predetermined intervals, these tubes are mechanically shaken to dislodge the collected dust which then falls down into the hopper. Each hopper is equipped with a swing gate valve which swings downward to empty the dust into standard lead oxide cans.

To keep the hopper-emptying operation dust-free, special lids are used on the cans. One end of a tight cylindrical canvas tube is clamped to the hopper, and the other end is fastened to the special lid. When these lids are clamped on the cans, the dust being emptied out of the hoppers is prevented from escaping into the atmosphere.

THIRD PRESSURIZED FURNACE

added to Knox Lee Plant of Southwestern Gas & Electric

IN EARLY 1950, power from Southwestern Gas and Electric Company's Knox Lee power plant began flowing into the power lines of East Texas. One of the outstanding features of the plant, located 10 miles southeast of Longview, Texas, was the installation of a pressurized furnace operating at 8.5 inches water gauge.

The Babcock & Wilcox 300,000 lb/hr boiler installed was a new departure in design in that the furnace was designed for pressure operation. No induced draft fan was required and only one forced draft fan was used. It is a 3,600 rpm, axial flow, single wheel fan driven by a 500 hp constant speed motor and is rated at 100,000 cfm at 25 in. of water pressure. Air flow is controlled by vanes on the inlet to the fan.

Pressure in the furnace at full load is 8.3 in. water, so special care was taken in design to reduce gas leakage through the setting to a minimum. Furnace wall tubes are 3 in. in diameter and boiler side walls have 3 in. tubes with studs. Back surfaces of all of these tubes are sealed with refractory cement covered with a 10 gauge steel skin casing. Five inch vermiculite block insulation and an outer casing of 10 gauge steel plate completed the boiler setting.

Operating advantages expected from the initial boiler installation were: (1) With no air infiltration through boiler walls, lower excess air might be carried with consequent higher boiler efficiency. (2) Auxiliary power requirements were expected to be reduced by 300 hp because of elimination of the inducted draft fan. (3) Attainment of simplified duct and stack arrangement.

Other Units

A second generating unit, indentical to the first, was placed in operation in 1951 and in July, 1952 a third 35,000 kw unit was placed in service. Completion of this third unit brings the Knox Lee capability up to 105,000 kw.

A five page description of the first unit of the Knox Lee Plant was featured in the April, 1950 issue of SP&I. Data includes water supply, fuel, buildings and equipment, extraction turbine, pressurized furnace, auxiliary service, and tabulation of principal equipment.

Principal Equipment
Third Unit—Knox Lee

Turbine-Generator—One—Westinghouse Electric Corp., AIEE-ASME preferred standard 30,000 kw, 3,600 rpm, 850 psi, 900 F and 1.5 in Hg. Generator 35,294 kva, 0.85 pf, 30,000 kw, 3,600 rpm, 0.8 short circuit ratio, 3 phase, 60 cycle, 13,800 v, hydrogen cooled.

Exciters—Main Exciter; One—Westinghouse, 145 kw, 250 v, direct connected, enclosed self-ventilated. Pilot Exciter: One—Westinghouse, 2.5 kw, 250 v, direct connected, enclosed self-ventilated.

Condenser—Worthington single-pass, divided water box, 25,000 sq ft surface containing 3,660 1-in. tubes 26' long, #18 B.W.G. arsenical copper.

Circulating Water Pumps—Two Worthington 36 in. hiflow vertical pumps, each 22,500 gpm at 25 ft total head, 400 rpm.

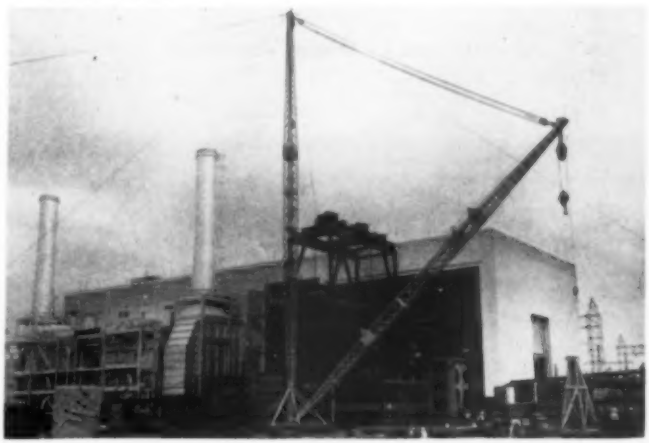
Condensate Pumps—Two Worthington 8 in. x 6 in. C 2 two-stage pumps, 500 gpm at 310 ft total head, 1,750 rpm.

Boiler Feed Pumps—Two Worthington 6UX-2 810 gpm, 2,625 ft head, 3,550 rpm, driven by two General Electric Co. 800 hp, Type 6348Z 2,300 v, 3,550 rpm induction motors.

Boiler—Babcock and Wilcox Company integral furnace, type FH outdoor type designed for pressurized furnace. Gas fired with oil stand-by. 300,000 lb/hr, design pressure and temperature 1,000 psi, 910 F.

Superheater—Babcock and Wilcox loop tube; final temperature 910 F automatically controlled by attemperator valve regulating circulation of steam through tubes in the bottom boiler drum.

Southwestern Gas and Electric Company's Knox Lee power plant before the stack for the third boiler was erected. The third 35,000 kw generating unit at this plant was placed in operation in July. Total plant capability is now 105,000 kw.



Promoting the utilization and development of the resources of the South & Southwest.

Speaker at the head table for the Friday luncheon is *Dr. Clifford K. Beck*, Dept. of Physics, N. C. State College, Raleigh, N. C. *H. McKinley Conway, Jr.*, Director of the Southern Association of Science and Industry, is shown in the foreground of the above view of the Friday morning session.

12th Annual Meeting of the S.A.S.I

Members of the Southern Association of Science and Industry Met in Winston-Salem, N. C., June 26-27th.

MEMBERS of the Southern Association of Science and Industry, representing fourteen Southern and Southwestern states, met in Winston-Salem, N. C., on June 26 and 27, to hear a series of addresses by outstanding leaders of business and research. The growth in synthetic textiles, petroleum, and petro-chemicals, as described by several of the speakers, is the best example of the type of industrial growth the South has experienced in the past few years.

Charles H. Rutledge, of E. I. du-Pont's Textile Fibers Department, and *Frank J. Soday*, Director of Research, The Chemstrand Corporation, called attention to the high percentage of total synthetic production located in the South and predicted that future expansion would also be concentrated in this area. It was emphasized that man-made fibers now account for about 22 per cent of the textile industry while only a small fraction of one per cent of the industry was in synthetics twenty years ago. Despite this percentage increase, the total pounds per person consumption of cotton and wool has increased from about 27 lb to 33 lb in the same period.

A. B. Patterson, Chairman of the Board, New Orleans Public Service, Inc., is the newly elected president of the Southern Association of Science and Industry.

New S.A.S.I. Officers for 1952-53

President—A. B. Patterson, New Orleans Public Service, Inc., New Orleans, Louisiana
Vice-Pres.—A. P. Black, University of Florida, Gainesville, Florida
Vice-Pres.—Frank J. Soday, Chemstrand Corporation, Decatur, Alabama
Secretary—George D. Palmer, University of Alabama, University, Alabama
Treasurer—Alva G. Maxwell, Citizens & Southern Nat'l Bank, Atlanta, Georgia

State Vice-Presidents include: **Alabama**—S. D. Moxley, American Cast Iron Pipe Company, Birmingham, Alabama; **Arkansas**—R. C. Taliman, Lion Oil Company, El Dorado, Arkansas; **Florida**—H. H. Sheldon, University of Miami, Miami, Florida; **Georgia**—C. L. Emerson, Georgia Institute of Technology, Atlanta, Georgia; **Kentucky**—R. E. Bisha, L & N Railroad, Louisville, Kentucky; **Louisiana**—C. H. Fisher, Southern Regional Research Laboratory, New Orleans, Louisiana; **Maryland**—D. C. W. Ward, Jr., Union Trust Company of Maryland, Baltimore, Maryland.

Mississippi—Dr. E. A. Wood, Northern Mississippi Industrial Development Association, Clinton, Mississippi; **North Carolina**—R. N. Marshall, Western Electric Company, Winston-Salem, North Carolina; **Oklahoma**—George L. Cross, University of Oklahoma, Norman, Oklahoma; **South Carolina**—Allan C. Mustard, Jr., South Carolina Electric & Gas Co., Columbia, S. C.; **Tennessee**—C. McD. Puckette, Chattanooga Times, Chattanooga, Tenn.; **Texas**—C. L. Shrewsbury, Southwest Research Institute, San Antonio, Texas; and **Virginia**—Raymond Long, Virginia Dept. of Economic Development, Richmond, Virginia.

H. McKinley Conway, Jr., Director of the S.A.S.I., maintains a central research office at 5009 Peachtree Rd., Atlanta, Ga. The Southern Association of Science and Industry is a non-profit, non-political organization to promote the technical and economic advancement of the South. The Society publishes the *Journal of Southern Research*, and has issued the first annual *Southern Industrial Directory*.

James F. Crist, Exec. Vice Pres., The Southern Company, Birmingham, Alabama, told the group that the chemical industry is growing faster than any other large industry in the nation, and it located more than half of its new plants in the South last year. In addition, *A. Voorhies, Jr.*, Director, Esso Laboratories, Baton Rouge, La., stated that the South has taken a dominant position in the manufacture of petro-chemicals, and the area can look forward to even greater expansion in the future.

Speaking on the industrial applications of atomic energy, *Dr. Clifford K. Black*, who heads the first privately owned non-AEC nuclear reactor in the United States, said that at Harwell, England, a nuclear reactor has been used for almost a year to heat an 80 room office build-

(*Continued on page* 124)

Here are a few of the South's leading business and industrial leaders attending the Southern Association of Science and Industry's 12th Annual Meeting in Winston-Salem, N. C.—In the usual order, *Hugo Riemer*, Allied Chemical & Dye Corporation, New York, N. Y.; *S. C. Parkinson*, Seaboard Air Line Railroad, Norfolk, Va.; *W. H. Caldwell*, State of Virginia, Richmond, Va.; *M. T. Delabar*, Norfolk and Western Railroad, Winston-Salem, N. C.; and *R. P. Reece*, City of Winston-Salem, Winston-Salem, N. C.

Above—*D. C. W. Ward, Jr.*, Union Trust Co. of Md., Baltimore, Md.; *Arthur J. Bazeley*, Cleveland Electric Illuminating Co., Cleveland, Ohio; *Parker Frisselle*, Dow Chemical Co., Midland, Mich.; *Dr. M. P. Etheredge*, Mississippi State College, State College, Miss.; *C. H. Rutledge*, E. I. duPont, Wilmington, Del.; *Ray E. Bisha*, Louisville and Nashville Railroad, Louisville, Ky.; and *Maurice L. Wilson*, Georgia Power Company, Atlanta, Ga.

Below—*L. O. Bradshaw*, Mississippi Power & Light Co., Jackson, Miss.; *D. A. Shields*, Pathfinder Div., Superior Coach Co., Kosciusko, Miss.; *Harry W. Clark*, NorthernMississippi Industrial Development Association, West Point, Mississippi; *William P. Rock*, Industrial Bureau, Baltimore Association of Commerce, Baltimore, Md.; *Les M. Taylor*, Mississippi Power & Light Co., Jackson, Miss.; and *Arthur J. Bazeley*, Cleveland Electric Illuminating Company, Cleveland, Ohio.

Expanding PLANT SERVICES

at Tennessee Gas Transmission's Station 14 near Catlettsburg, Ky.

New addition to Station 14 near Catlettsburg, Kentucky. Vertical tanks are the scrubbers which clean the incoming gas of foreign particles before it enters the compressors. Dirty scrubbing oil is pumped into the settling tanks in the foreground for cleaning. The two-element cooling tower at far right takes care of cooling the gas before it enters the outgoing lines.

By W. W. ARMSTRONG, Project Engineer, Power Department, Dravo Corporation

As the engines use the gas forced through the transmission lines, there is no fuel problem. However, most compressing stations require all the utilities of the average industrial plant or municipality.

COLLECTING natural gas in Texas and Louisiana and delivering it to market in Tennessee, Kentucky, West Virginia, Pennsylvania, and the New England states is the job of the Tennessee Gas Transmission Co. A new 303 mile, 24 in. extension across New York to Massachusetts is now providing deliveries of the first natural gas in the history of that area.

Connecting such a large load (156,000,000 cu ft daily authorized) to the end of a long transmission system required the installation of higher delivery capacity in the form of pipelines and compressing stations. This expansion raises the transmission capacity of T.G.T. to 1,200,000,000 cu ft. Coupled to the system are 20 compressor stations, having a total installed capacity of 380,000 hp.

Typical of additions to existing plants is the work done at Station 14 near Catlettsburg, Kentucky, on two lines feeding West Virginia. Plant originally consisted of thirteen 1000 hp compressors. Its capacity was increased by installing five 1,000 hp, 10-cylinder, 2-cycle, V-type gas engine driven compressors. The addition includes the necessary mechanical and electrical machinery to furnish station services.

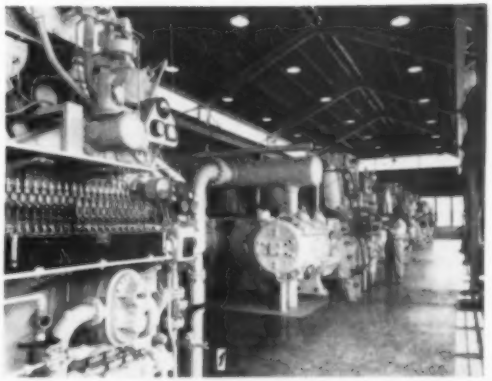
There is no fuel supply problem other than piping and metering, because the engines use the gas they force through the transmission lines. But they do need plenty of cooling water and numerous pumps, coolers, etc., as well as electrical energy. In fact the usual compressing station with its community dwellings requires all the utilities serving a small municipality, from water treatment to sewage disposal. The illustrations on the opposite page show some of the primary and secondary equipment involved.

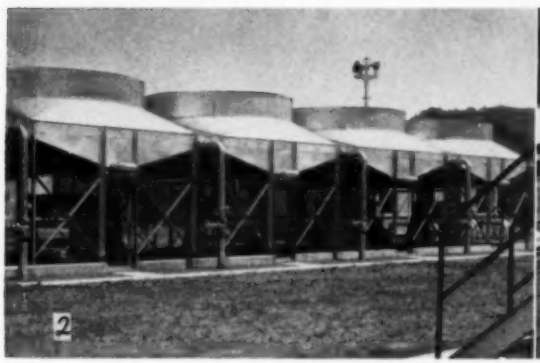
Safety features have been built into the addition along the lines of best practice. For instance, all electrical equipment is well grounded and explosion proof fittings and fixtures are used in hazardous areas. A large station gas vent line connects to all gas piping and relief valves, and terminates outside the station area proper. Thus, escaping gas or that released from lines undergoing repairs can be vented harmlessly.

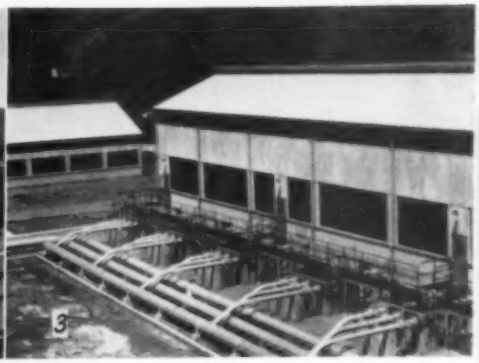
Buildings are of rigid frame steel construction with corrugated asbestos siding. A panel of translucent Corrulux (shown in interior views) encircling each building provides additional lighting over that supplied by the windows.

Sewage is disposed of in a three-compartment septic tank with outflow to laterals embedded in a gravel-filled disposal field. Earth dikes around the field prevent flooding during heavy rain storms.

New compressor units for Tennessee Gas Transmission's Station 14, are 1,000 hp, 10-cylinder, 2-cycle, V-type gas engines driving three 11 in. x 14 in. single stage compressing cylinders equipped with bakelite rings. Units stand on individual concrete blocks, which rest on a common 18 in. concrete foundation slab. Compressors are housed in a steel and asbestos building having a Corrulux panel near the roof for overhead lighting. Piping to compressors has welded and flanged joints with no special provisions for expansion or vibration.

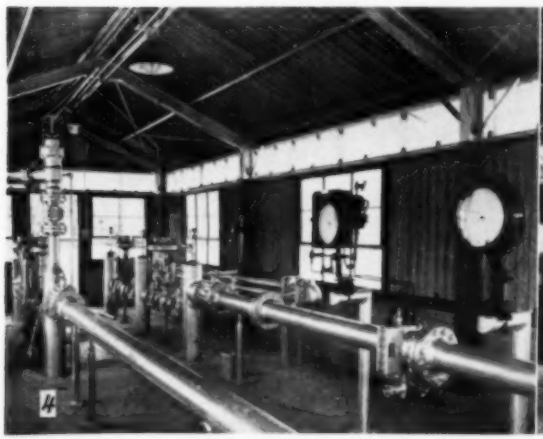


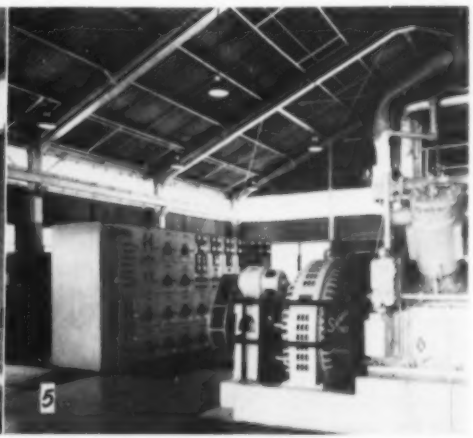




A closed central circulating system between engine jackets and radiator coolers—2—minimizes scale trouble, but requires several motor-driven circulating pumps. Fresh make-up comes from the water purification plant. Each compressor can take gas from either of two headers—3—and discharge it into the outgoing line. Intake filters clean the combustion air going to the engines and mufflers keep exhaust noise to a minimum. Governor control can be adjusted to vary engine speed to maintain constant compressor discharge pressure.

Fuel for the engines, coming from a station main, enters the metering building—4—where a duplicate set of pressure-reducing lines can feed through cross-overs into the metering line, which supplies the station. Further reduction in pressure occurs at each engine before the gas enters the fuel regulator. Starting air for engines is supplied by two air compressors—one motor-driven and the other having a combination motor and gas engine drive. Electricity for station use in driving the various pumps, cooler fans, air compressors and lighting comes from three gas engine driven generators—5. Each 250 kw, 480 volt generator is driven by a 370 hp, 4-cycle, V-type gas engine. Tie-in facilities permit paralleling with the original power plant during emergencies or for economical operation.





Comments on

PIPING INSULATION

for air conditioning systems

Placing insulation in half sections around dual temperature piping at the Kaymont Corporation air conditioning installation in Washington, D. C. These are dual temperature lines — from 40 F in the summer to 180 F in winter.

By FRANCIS A. WESTBROOK

Photos courtesy Pittsburgh Corning Corp.

THESE two brief case histories illustrate the proper applicational methods for pipe insulation.

Dual temperature lines, as used in the Kaymont Corporation plant in Washington, D. C., are shown above. On this job, 1½ in. Foamglas pipe insulation was used for ½ in. to 6 in. pipe, applied dry with the joints buttered with a fibrated asphalt cut-back and held in place with copper wire.

Foamglas is a cellular glass insulation consisting of very small sealed cells filled with air. It is light weight, incombustible, verminproof, and has unusually high resistance to moisture, chemicals and other elements that cause insulation to deteriorate. It can be cut and worked into any desired shape on-the-job with ordinary tools. It can be cut away for welding, drilling, tapping, etc., and it is not necessary to keep the exposed insulation dry.

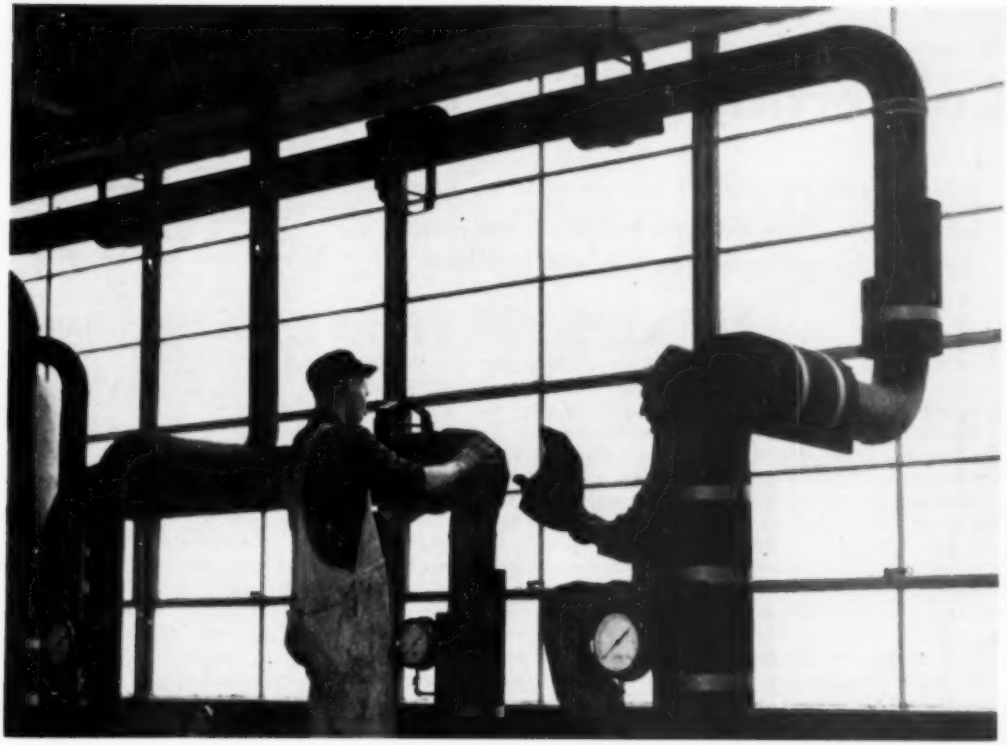
The other pipe insulating job illustrated was for the chilled water lines of an air conditioning system at the A. B. Dick Company, manufacturers of mimeograph and duplicating equipment. Insulation was needed to eliminate moisture condensation, with a resultant dripping on production equipment and manufactured products.

Insulation used was 1½ in. thick. For standard duty or standard brine, the nominal thickness should be 2 in.; for heavy duty or special brine, nominal 3 in. is specified; and for extra heavy duty a 4 in. thickness is recommended. Insulation was adhered with a rubber base cement, temporarily banded with paper tape and later covered with 8 oz canvas without paint finish.

Applicational Data

Insulation is held in place by metal bands usually placed on 9 in. centers starting 4½ in. from the end of a section. They should not be drawn too tight.

In applying the canvas covering, one layer of rosin-sized paper is wrapped around the insulation and taped in place. Arabol cement is then applied, wrinkles smoothed out, and edges carefully cemented so that they will be flat. Canvas may also be applied directly to the insulation with cold water paste for indoor cold applications but it is necessary to seal the asphaltic materials to prevent bleeding.



These are chilled water lines of a mimeograph and duplicating equipment manufacturer. Insulation was needed to eliminate moisture condensation with a resultant dripping on production equipment and manufactured products. Insulation sections for these bends and for standard fittings and valves may be obtained ready for application from the manufacturer or may be made on the job from standard blocks and standard pipe insulation.

On such cold installations all joints are sealed with the joint material used on adjacent pipes or with hot asphalt or other mastics, depending on the temperature. Hot asphalt, Armstrong's 299 or Insul-Mastic 4010 are suitable for temperatures down to —25 F. Pittsburgh Corning's Permastic or Benjamin Foster's 30-45 are good joint sealers for temperatures as low as —50 F. As these are not adhesives, the insulation must be supported.

It is important that sufficient bands or wires be used to hold the fitting and valve covers firmly in place. Voids between fittings and covers may be filled with brine

(Continued on page 124)

Another view of the insulation job at the Kaymont Corporation. The fibrated asphalt joint sealer being applied was used on all end and longitudinal surfaces. All joints and chipped edges were filled and sharp edges smoothed before finish application.

Converting Boilers to Gas Fuel

You can't write a handbook, set down all of the rules and say that this is it. To do the job, you must know your boilers and have experience with other fuels.

By L. S. REAGAN

Vice President and General Manager
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FRANKLY, 90 per cent of the success of any gas burner conversion is in knowing how to apply the equipment.

The proper mixture of gas and air is necessary to obtain proper combustion, and to get this air you must have some method of getting the air into the burner so that it can mix with the gas. The most common method on the smaller boilers is the use of a stack or chimney to create sufficient draft to overcome the draft loss across the gas burner, furnace, boiler, uptake damper and breeching so that the air for combustion will flow through the burner due to this negative pressure. The next method is the use of a fan forcing air to the burner in the amount that will overcome the draft loss across the burner and the use of a stack or chimney to overcome the draft loss through the balance of the system. In lieu of the stack or chimney an induced draft fan is sometimes used in conjunction with the forced draft fan to eliminate the high stack. Last but not the least is the use of an induced draft fan only.

Draft Is Important

One important point is often overlooked when a boiler has been operating with a stoker and it is decided to convert to gas fuel and, to keep the cost of equipment down and eliminate the cost of fan operation, straight natural draft is decided upon. Before this decision is final a careful check of available draft from the chimney should be made. To illustrate what can and does happen, note the following example:

A 500 hp boiler operating at 150 per cent of rating has a total draft loss through furnace, boiler, uptake damper and breeching of 0.5" wc plus a slight negative in the furnace of 0.05" wc making a total of 0.55" wc. The height of the chimney is such that you have a total of 0.6" wc available. Now with your stoker having forced draft you can carry your load, but if you place a gas burner in the boiler that has a draft loss of 0.2" wc at maximum rating you are going to be short 0.15" draft and you will not be able to carry your desired load. Too many times, through ignorance, the burner salesman will size the burner on capacity only, not taking the draft loss into consideration.

Combustion Space

Due to certain characteristics of natural gas complete combustion must take place in the furnace before passing into tubes or tube banks. If this is not accomplished CO will be formed and vibration and pulsation will very probably occur. As you all know coal combustion can and does take place in tubes and tube banks without forming CO or causing pulsations so when you come to changing over to gaseous fuel you will find, in many cases, the combustion space will not be sufficient to give the same rating on gas as with coal.

Where a boiler has an all refractory setting the Btu release per cubic foot of space should not exceed 35,000 with gas.

With heating boilers such as the steel firebox type, where they have waterlegs and the refractory section of the setting does not exceed $\frac{1}{3}$ of the total space, 50,000 Btu release is permissible.

With water tube boilers that are equipped with water walls, with tube spacing not exceeding 9" centers, releases as high as 60,000 Btu have been recorded.

With the latest type of so-called package boiler having a completely black furnace we have been able to get releases as high as 92,000 Btu per cu ft.

But the amount of combustion space, like everything else, can still be overdone and we have found that when the release gets below 20,000 Btu you can still have the heating surface so far away from the gas flame that it is impossible to get the desired rating as the furnace wall area is then so great that a large percent of the heat is dissipated by wall radiation. This is particularly true in large refractory set boilers that have been designed for powdered coal.

Heating Surface Exposed

It has been found that wherever you try to develop more than 10 bhp per square foot of heating surface exposed to the furnace the risk of tube trouble due to breaking of circulation and accelerated tube deposits arises and this should always be given first consideration in setting up the firing rate.

Burner Selection

In selecting the burners the following must be taken into consideration: gas pressure, flame pattern and draft loss across the burner. Gas pressure is normally classed as low pressure 2" wc to 8 ounce, intermediate pressure 9 ounce to 3 psi and high pressure 4 psi and above. Whenever possible use as high a gas pressure as available, as a shorter and more stable

Presented before the Industrial Fuels Combustion Institute, conducted by University Extension Division and the College of Engineering of the University of Wisconsin.

flame can be obtained with the higher gas pressures.

The flame pattern is dictated by the shape of the furnace. If the furnace is short then a burner or burners should be selected that will cover a great percentage of the width of the furnace and in no case should a burner or burners be used that cover less than 75 per cent of the furnace width.

The draft loss across a burner at its maximum rating is dictated by the amount of draft available. For natural or induced draft fan operation a maximum loss of 0.3" wc normally should not be exceeded because when you go above this value the amount of air entering the furnace through cracks, etc., becomes excessive and reduces the efficiency. We have found that 0.2" wc draft loss is the most satisfactory if it possibly can be maintained.

Due to the small amount of luminosity in a gas flame compared with that of coal or oil, an increase in superheat usually will occur when changing from coal or oil to gas, especially with boilers with water walls. This is due to the fact that the high luminosity of coal or oil transmits more heat to the water walls by radiation than does the gas therefore reducing your gas temperatures through your superheaters. With proper gas burner application this can be remedied to a great extent but each project is an individual problem and must be given serious thought in burner selection as to flame pattern and the number of burners used.

Types of Burners

Gas burners used in boiler conversion work are of two basic types, namely 100 per cent secondary air mixture and the commonly known premix type which is of a venturi tube design where you have a primary air and gas mixture as well as secondary air and gas mixture. The premix type is the most stable due to the partial premix and should, wherever possible, be used where only low pressure gas is available.

Efficiency

Efficiency of any equipment is dependent on three things; design, application and operation. No matter how well a piece of equipment is designed, if it is not applied and operated properly all the advantage of design is lost.

There are two efficiencies. One is the test run efficiency which is made with the manufacturer of the equipment on the job seeing that everything is in order to produce the best. The other efficiency is that which can be obtained by normal operation over a monthly period. This efficiency is the one that really counts and must be given the greater consideration when comparing fuel costs. Coal and oil each will give greater efficiencies (theoretical) than gas on test runs but in day to day operation, due to the ease of control of gas, you will find that the difference is not as great as it is shown to be theoretically.

The accompanying chart (average overall efficiencies of boilers 500 hp and under) shows the results obtained over a great many years of experience.

While this discussion seems like a negative approach for gas as a fuel it really is not because we, as The Webster Engineering Company, who for 30 years have built and installed gas burners for boilers, feel that there has been too much talk as to how easy it is to properly apply gas as a fuel and that the industry should be forewarned of the difficulties that may arise and be more careful in selecting companies that have had enough experience to know what they are doing so that an installation may be started up and placed into operation without having to experiment at the customer's expense.

AVERAGE OVERALL EFFICIENCIES OF BOILERS 500 HP AND UNDER*

Type of Boiler	Percent of Rating	GAS	OIL	COAL (Stoker Fired)	COAL (Hand Fired)
SBI Steel Heating such as Kewanee, Erie City, Titusville, Fitzgibbons, etc.	100	75	78	75	60
	125	73	76	73	58
	150	70	73	70	55
Horizontal Return Tube 4" Tubes	100	73	76	73	58
	125	70	73	70	55
	150	65	68	65	50
Horizontal Return Tube 3" Tubes	100	75	78	75	60
	125	72	75	72	57
	150	67	70	67	52
Scotch Marine	100	76	79	76	61
	125	74	77	74	59
	150	71	74	71	56
Water Tube such as Type VL, Wickes Type A and Keeler Type CP	100	77	80	77	—
	125	76	79	76	—
	150	75	78	75	—
Low Head Water Tube such as Erie Type C and B & W Type H	100	75	78	75	—
	125	74	77	74	—
	150	73	76	73	—

* The above efficiencies apply to boilers of 500 hp and under, without preheaters and superheaters. Where the larger capacity boilers and steam generators are to be considered, efficiencies will increase for all fuels in approximately the same ratios. Where powdered coal is used with preheaters, efficiencies can go as high as 87% plus, while gas is limited to 84% plus.

Mechanical safeguards alone will not prevent accidents. What other important factor can we work with on the job?

THE HUMAN ELEMENT in Industrial Safety

"Our safety program is fine, but it costs too much." That is a statement you are NOT LIKELY to hear, because the results of a good safety program always outweigh the expense.

By N. H. MAILHOS*,
Superintendent of Power
Brunswick Pulp & Paper Co.,
Brunswick, Georgia

INDUSTRY has spent thousands of dollars, in the past few years, providing adequate mechanical safeguards on machinery and equipment to guard and protect its employees against the hazards encountered in the modern Industrial Plant. In spite of this enormous expenditure, the accident rate remains much too high, causing excessive mental and physical suffering of the employees and their families. It is quite obvious that mechanical safeguards, though absolutely necessary in the Safety Program, are not a panacea for the prevention and elimination of accidents.

If mechanical safeguards alone will not prevent accidents, and they have not in the past, what other factors are involved that must be dealt with in the accident prevention program? The main and most important factor is the human element, the individual employee. Statistics show that 92 per cent of all industrial accidents are attributable to the human element. How then can we improve the safety record and eliminate accidents by working with this very important element?

Let us first try and define "Safety." Mr. Webster defines "Safety" as "freedom from danger, injury or damage; security." My definition of safety is "the state or frame of mind of the individual employee that produces freedom and security from danger, injury or damage for himself and his loved ones." Just how shall we go about getting the employee in the right state or frame of mind?

A Good Safety Program

Let us first list what we think are the requisites of a good Safety Program and then discuss each on its own merits:

Requirements:

1. Appointment of a competent, conscientious and diligent Safety Engineer.
2. Establish Safety Committees —Executive, General Mill and Employee.
3. Establish an ironclad, workable set of Safety Rules and Regulations.
4. Develop an Education Program.
5. Establish an adequate Housekeeping and Maintenance Program.
6. Establish an Employee Mental & Physical Health Maintenance Department.
7. Establish an Awards Program.

In the opinion of the writer, the above seven basic requirements are essential to the successful propagation of a Safety Program.

Safety Engineer

The need for a Safety Engineer is very great in a plant of any size and the responsibility of administering the Safety Program rests in him. The man selected for this position should be well schooled in engineering and familiar with modern machinery and equipment in industrial plants of today. However, this is a secondary requirement. The primary requirement should be that he be well versed in psychology — the psychology of dealing with and handling people. He must work with and through the Department heads, Supervisors and Foremen in dealing with the individual employee. Therefore, a thorough understanding of human nature is essential. Lack of this understanding has created quite a few difficulties for Safety Engineers.

After the selection of the Safety Engineer management should publish a statement of the power vested in him to administer the Safety Program, defining the disciplinary action he is to take for first, second and third infractions of the Safety Rules and Regulations. The procedure he is to follow when he finds machinery and equipment not properly guarded should also be publicized. After the policy is established concerning the above, it should be adhered to very diligently.

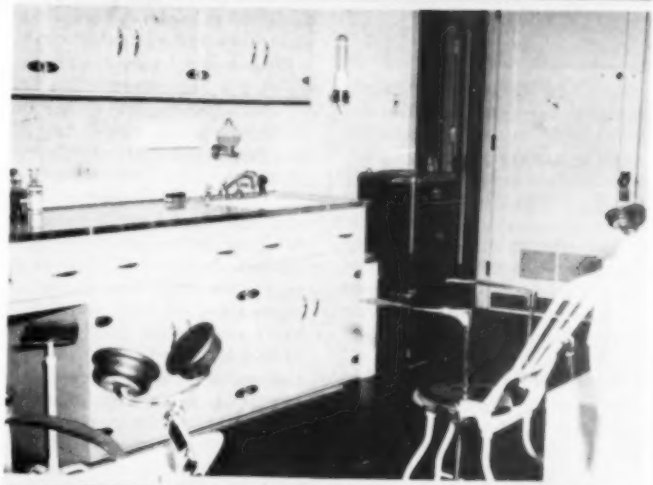
* The ideas and opinions set forth are the writer's and should not be interpreted as the policy or practice of the Company.

The photographs at right show some important elements in the large industrial plant safety program.

The Doctor's office.

A modern first aid treatment room.

Sterilizing and microtherm heat treatment room.



The Safety Committees are a very important part of the safety program. A very feasible plan is to have three Committees:

1. An Executive Committee composed of all Department Heads.
2. A General Mill Committee composed of all Department Supervisors.
3. An Employee Committee composed of at least one employee from every Department in the Plant.

By arranging the Committees in this way you have a definite line of responsibility for Safety in every Department.

Rules and Regulations

The Safety Engineer should call together all Department Heads, Supervisors, Foremen, employee representatives and the Safety Engineer for the Insurance Carrier for the purpose of drafting a set of Safety Rules and Regulations. He could set up the rules and regulations himself, but by bringing in the others and getting their ideas and incorporating their good ones he has them committed to assist in administering them. After management approval these rules and regulations are the guide in administering the Safety Program.

Educational Program

The Safety Engineer should then set up an Educational Program. There are various means and ways of educating the employees and keeping the program before them. Classes of instruction, use of slides and movie projectors, and on the job checking for unsafe practices.

The first to be schooled and instructed in the program are the Department Heads, Supervisors, and Foremen. It is very important that all of these be sold on the program and management should

make it very clear that the success of the program is their responsibility as well as the responsibility of the Safety Engineer. An uncooperative attitude of just one Supervisor can doom the entire program to failure.

After this is accomplished the task of schooling and educating the employees can be undertaken. The Safety Engineer can draw from the Department Heads, Supervisors and Foremen for class instructors in presenting the rules and regulations to the employees. Here again, he gains the cooperation of these men in the program and further familiarizes them with the rules and regulations. After this is completed the program can be put into operation.

Housekeeping and Maintenance

Good housekeeping and Safety go along together. For example, the accident record is generally better in a plant which has good housekeeping and maintenance than in a plant which has poor housekeeping and maintenance. In fact, most of the Safety recommendations from the Employees' Safety Committee are due to poor housekeeping and inadequate maintenance.

Mental and Physical Health

When first considering this it may seem quite unusual and unnecessary, but is it? Industry sets up elaborate mechanical and electrical maintenance departments to properly maintain the machinery and equipment in the plant, and these departments are quite necessary to keep the plant operating. Does it sound plausible to put an employee in charge of a valuable machine who has not had a check up in almost a year? The employee may be temporarily under extreme mental or physical strain and wreck this very valuable piece of machinery with resultant loss of production, or so operate it that quality and production will suffer.

Most large industries today employ a doctor for yearly physical checks of their employees. They also have plant nurses on duty to administer first aid to employees in case of injury and adequate First Aid facilities. They also have hospitalization insurance to cover a portion of the cost of doctor and hospital bills of employees and their families.

This is all very good and is a step in the right direction, but does not go far enough. Upon examination today an employee could be in the best of health physically and mentally, but two days, two months or six months later could be under such physical or mental strain that he could not safely perform his duties, and this could not be detected by the layman. Let's set up a mental and physical health maintenance department to keep a running check on our employees as we do on our machinery and equipment. Today experienced personnel is harder to secure than machinery and equipment.

What would be required to set up such a Department? The services of a doctor, plant nurses and sufficient visiting nurses to visit the families of the employees. Also, insurance should be provided to completely cover all costs of doctor, dental and hospitalization when authorized by the maintenance department. This would relieve the employee of constant worry about what he would do if he or some of his family became ill and, if properly sold to the employees, they would be glad to participate in the cost of such a program. The visiting nurses could keep a watch on the health of the employees' families guarding them against needless sickness with resultant worry to the employee.

The selection of the visiting nurses should be made with extreme care and caution. They should have a very pleasant and pleasing disposition, and be capable of winning the confidence of whomever they may confer with. They, by no means, should assume a dictatorial attitude. Their purpose is to visit with the employee and his family—winning their confidence—thereby being able to ferret out anything that may be causing them to worry. This could come from financial difficulties, mental or physical illness, or some imaginary difficulties and you would be surprised at how many of the latter would be encountered.

When the visiting nurse runs into these difficulties, whether real or imaginary — she is to report them to the proper designated authority for handling immediately and in the appropriate manner.

Would the cost of such a program be prohibitive? Not likely, if the benefits to be derived over a period of time are considered. What benefits could be expected from such a Department? Reduction of accidents, happier and more carefree employees, increased production, better quality and less maintenance on and replacements of machinery and equipment due to better operation. It would be hard to put a dollar valuation on such a Department

Awards Program

This is a very controversial subject. There is the argument that working safely is a part of the employees' responsibility and he should not be given additional compensation for so doing. There is no denying that point—it is quite true. However, the purpose of the Awards Program is not primarily to give the employees additional compensation for doing a job, but to stimulate interest in the Safety Program and keep the employees "policing" each other. The Awards Program has been tried and proven and it produces that effect.

The awards should be so selected that they not only interest the employees but their families as well. This has the desired effect of keeping the family interested and active and in keeping the employees happy, healthy, and safe.

The number of awards, the elapsed time without a lost time accident before presentation of awards and the method of presentation depends entirely on the individual plant and its personnel.

It is only human that we continually strive to eradicate accidents from industry, thereby minimizing the misery and suffering that these accidents cause among our fellow workers and their families. It is with that thought in mind that this is written and it is hoped that, in some small way, this may contribute to improving our Safety Program in Industry.

HIGH STACKING Pays Off in Florida Warehouse Operation

Maintaining zero temperature in a warehouse can only be justified by keeping it full of revenue freight. Thus the necessity for high stacking. Three electric trucks work smoothly in extreme temperature ranges.

IN Jacksonville, Florida, the Patterson brothers' venture into the field of handling perishables, with emphasis on frozen foods, began with the construction of a one-story warehouse, 316 x 192 ft, with 20 ft of free height below roof trusses. A dividing wall across the 316 ft width separated the building into two halves.

The cold storage warehouse is flanked on one side by a railroad and on the other by a truck dock. Entrance and exit are made by mechanized trucks and a Transporter driver-led electric truck through sets of temperature-lock doors. Along the railroad side of the building, is an area 17 ft wide, pierced by one temperature-lock set of doors in each of the two sections. Along the front, or truck dock, are coolers, kept at 40 F, as distinguished from the main freezing warehouse.

The coolers occupy 144 ft of warehouse width and are 11 ft high and extend to a depth of 37 ft. They open only outside on the truck dock. One door leads from each of 5 cooler rooms to the truck dock. The top of this line of coolers, reached by fork lift trucks inside the warehouse, is used for frozen storage.

The building is separated into two rooms with stacking bays ranging from 22 to 50 ft deep, serviced from aisles 13 ft wide extending across the rooms in two directions so that fork trucks have easy access between storage bays and door locks.

In practice, sometimes the cross aisles are filled solid, forming a square mass of merchandise accessible only from the end aisles. Such large quantities must be solid shipments, for it is routine to move the oldest batch of a given food first, and solid storage must be all of one order to prevent an impossible amount of re-stacking.

This Automatic Transportation Company truck is stacking the fourth, five foot high, 3,430 lb gross load of frozen orange juice in the Patterson Cold Storage Warehouse in Jacksonville, Florida. For this high stacking, Automatic's 168 in. masts are used. Stack tops are kept as close to the 20 ft maximum as multiples of loaded pallet heights will permit.

Traffic patterns cannot be defined, since merchandise may come from any truck on the street side or any freight car on the railroad side and is carried and stacked anywhere inside.

Docks on both sides run the full 316 ft length of the building, and are each 17 ft wide. Two door locks open on each dock, one from each section on each side of the building. This entails more running back and forth, both inside and outside, than in non-refrigerated warehouses where door space is equal to wall space if not more.

The result is that fork trucks and the Transporter runs vary from 30 to 300 ft, depending upon where the truck starts, from an area in a far aisle to the dock, or from the door to a storage area.

The man in the Parka moves out of a —3 F cold storage room to deliver frozen food to a checker in a sport-shirt, working in 90-95 temperatures. The Patterson Cold Storage operation uses three Automatic Skylifts and one Transporter. The only provision for the extreme cold that the Automatics require is the use of low temperature hydraulic fluids and lubricants.

ELECTRICITY and ELECTRIC POWER

Part 5—Power Factor Theory

By ROY W. WAGES
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EDITOR'S NOTE: *We believe no term used in the electrical industry creates more general confusion than power factor. The reader will note from the author's introductory paragraphs that he is tempted to skip discussion of it entirely, but he knows that a working knowledge of the term and its usage is essential for the plant man who wants to advance toward full responsibility for maintenance and operation of electrical equipment.*

So we invite the reader to study thoroughly the author's discussion of the subject, and as a reward we promise that much of the mystery and confusion caused by power factor will vanish into thin air.

The discussion is long and a bit tedious. We have divided it into two installments. This first half deals with definitions and mathematics of power factor—the coming installment will help the reader apply this new knowledge to everyday plant problems.

SO MANY articles have been written recently about Power Factor that for some time I doubted whether a discussion of the subject in this series of papers prepared for "the man in the plant" would be worthwhile. But in the course of composing the preceding installments several friends of mine among plant electricians and mechanics asked that the subject be included; and it is in answer to their request that I have prepared this discussion on Power Factor.

Power Factor, like a lot of other expressions and words used in the electrical profession, is often misused and misunderstood. But it shouldn't be. Power Factor is a phrase used in our trade to describe a certain fact, or phenomenon, just as the expression "an inch of rain" is used by weather forecasters. Many people do not know what the expression "an inch of rain" means; but that doesn't deter the professional weather forecasters from using the phrase. So it is with us: we, in our trade, or profession, have some terms that cannot readily be "translated" into commonly used phraseology; but which can, and do, have a definite meaning for us. If we will consider the expression "Power Factor" in this light, it will have no mystery for us nor any hidden meaning.

First of all what does the word "power" mean to electricians? Or, more specifically, what does "electric power" mean? We learned in the very first article of this series of papers that "electric power" was the harnessing of electricity and putting it to work. "Power," then, is force, or the ability to do work.

Definition

Now, what does the word "factor" mean? "Factor" is "any one of the circumstances, elements, etc., which produce a result." *An element or circumstance that produces a result.* That's what a factor is regardless of its character or the sense in which the word is used.

Nothing mystifying about that, now that you've had time to turn it over in your mind, is it? Factor: *something that determines or controls the result.*

Now. **Power factor** obviously has to do with power. So, we can say that power factor is an element that determines, or controls, the resultant power delivered in an alternating current system.

The use of the expression (which like ampere, watt, volt and other electrical terms, was made up to fill a need for a descriptive term) came into being because of the very nature of alternating current systems. Remember back in Article 1 of this series, we said that

$$W = E \times I$$

where W stood for watts (power); E stood for volts (force); and I stood for amperes (current).

We also said that while the equation

$$W = E \times I$$

was true for direct current, it was not quite true for alternating current.

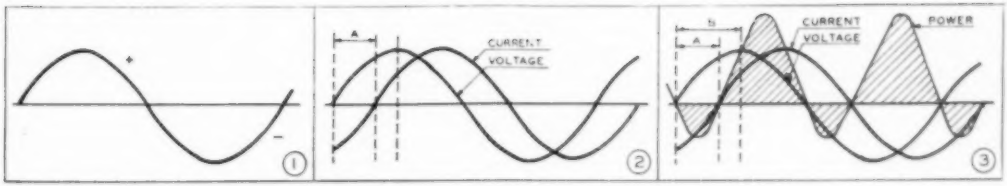
The Sine Wave

The reason it is not quite true for alternating current is that in most alternating current systems the voltage and the current do not "pull" together.

The current does not move continuously like direct current, which may be represented mathematically by a straight line. Alternating current varies from positive to negative and has to be represented by a curve. See Fig. 1.

The current changes from a positive value to a negative value in a certain prescribed time sequence. In other words, it "alternates" from positive to negative. That is where it gets its name of "alternating current." When the current alternates sixty times in one second, that is, makes one complete change every 1/60 of a second, it is called sixty cycle current.

Neither does the voltage move in a straight line as it does in d-c systems.



Figures 1, 2 and 3

Both voltage and current move in a peculiar curve, called a "SINE" wave. See Fig. 2.

That figure graphically illustrates a case where the current lags behind the voltage by an amount of "A" degrees in time-space relationship. A few paragraphs further along we will discuss in more detail these time-space relationships of forces. But right now, let's confine our discussion to current and voltage.

Now, if we go back to Fig. 1, and graphically portray the power curve that represents the resultant of the current and voltage we will have Fig. 3.

Cosine A

Without going into a special course in mathematics, and without presenting a lot of complicated equations, let's "accept on faith" this mathematical fact: That in cases where the current lags the voltage by the amount of "A" degrees as illustrated in Fig. 3, *the average value of the power for one complete cycle* can be expressed by this equation:

$$P = E\ I\ \text{Cosine}\ A$$

where P = Power, E = Voltage, I = Current, and A = the angle between E and I.

When we say, in alternating current systems:

$$P = E\ I$$

E I (or P) is the *apparent* power —not the *true* power. The *true* power is

$$P = E\ I\ \text{cosine}\ A$$

The expression "Cosine A" is the "*factor*" that determines the *amount* of *true* power delivered.

For instance, if cosine A = 0.5, then the real, *true power* would be only one-half of the *apparent power*. If cosine A = 0.75, then the real, *true power* would be three-fourths of the *apparent power*.

Since the value of "Cosine A" is the element, or factor, that determines the resultant power (which is the definition of the word "factor"); the expression "Cosine A" is called the "*power factor*."

To more clearly distinguish between the *Apparent Power* and the *True Power*, we usually speak of Apparent Power (EI) as "volt-amperes" and speak of True Power (EI cosine A) as "watts."

Inasmuch as power factor is that factor which, as we have shown, is the factor or element that determines the amount of true power delivered by an a-c system, we might well establish another definition for power factor by saying that "Power Factor is the ratio of the true power to the apparent power." That definition will assist us later.

Before proceeding further on the subject of power factor, let's pause for a moment and talk a bit about arithmetic and mathematics.

Calculations

If we have a force of one pound pulling in unison with a force of another pound, the total force exerted will be: 1 lb + 1 lb = 2 lbs. When we can determine the result of two such forces, or quantities, arithmetically we call them *scalar* quantities. Scalar quantities are quantities that have magnitude only. We can do all right with just scalar quantities so long as the quantities act in the same space plane, and they may represent graphically (Fig. 4). (Let's take for our scale 1 inch = 1 pound):

Then, if we measure the resultant line we will find it is 2" long and, since we have chosen a scale of 1" = 1 lb, the resultant force is 2 lbs.

Vectors

Now, let's take the same two forces of 1 lb each and let them pull, not in unison, or in the same plane, but at an angle of 90 degrees with each other. Portraying this graphically, it would look like Fig. 5 (using our same scale of 1" = 1 lb).

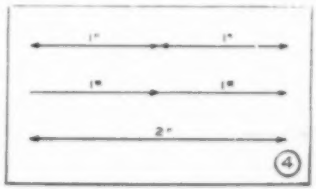


Figure 4

At this point we have to stop dealing with scalar quantities and deal with what mathematicians call *vector* quantities. A *vector* quantity is a quantity that has *direction* as well as *magnitude*.

Here is how we determine the resultant force of two forces pulling at an angle with one another.

We draw to scale Fig. 6. Then we draw one line parallel with an equal to one of the forces, Fig. 7, and draw another line parallel with and equal to the other force Fig. 8. Then we draw a line to connect the opposite corners, Fig. 9.

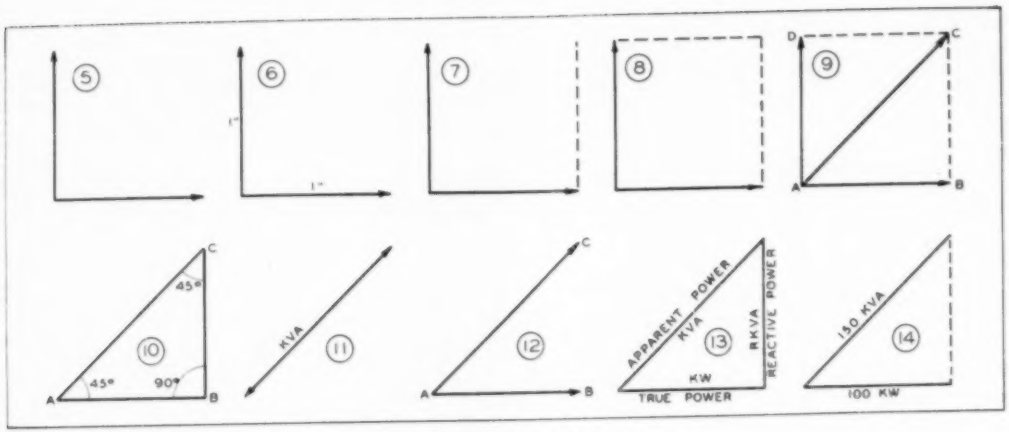
That line we just drew is the *resultant* force of our two original forces pulling at an angle of 90 degrees with each other.

Now, if you will measure to scale this *resultant* force of two 1-lb forces pulling at 90 degrees to one another, you will find that it is not 2 lbs, as was the case where the two forces acted in line with each other, but only 1.4142 lbs.

Trigonometry

It is not always convenient for us to take the time and implements to draw force diagrams to scale, so a way was devised a long time ago to solve for the resultant forces by means of mathematics.

Those of you who have studied trigonometry will not be particularly interested in the next few



Figures 5 through 14.

paragraphs, but for those men in the plant who have not had the opportunity to study that branch of mathematics, they will find it not only interesting but helpful. It is essential to acquire at least a "speaking acquaintance" with trigonometry if one is to fully understand power factor. So, here is a quick short course in the parts of trigonometry needed for our purposes here.

We learned from our drawn-to-scale Fig. 9 that the resultant, of the two 1 lb forces acting at an angle of 90 degrees to one another, was not 2 lbs but 1.4142 lbs.

Now, let's solve the problem mathematically instead of graphically, using Fig. 9 again. And, for convenience let's designate the sides and points A, B, C, and D as shown on the sketch, Fig. 9.

We said that the two 1-lb forces acted in space at an angle of 90 degrees to one another. If that be so, then, from the very way that we constructed our force diagram, the angles at A, D, C, and B would have to be 90 degrees.

The diagonal line AC bisects the angles at A and C, so if we take one-half of our force diagram we will have Fig. 10.

We know that AB is a force equal to 1 lb. We want to determine, mathematically rather than graphically, the magnitude of AC.

Here's how we do it. A long, long time ago a mathematician, or group of mathematicians, learned some things about triangles and then made up some rules about those three-sided figures. They learned, for instance, that the relationship of one side of a triangle to another side of the same triangle constituted a very definite numerical value, the side or magnitude of which depended upon the size of the angle separating the sides. Those old mathematicians gave some strange-sounding names to those relationships; and, after many, many years of study, made up a set of numerical tables that showed the numerical value of those relationships for all angles between 0 degrees and 90 degrees (90 degrees being commonly called a "right angle"). Now that we have had that bit of a historical review of the subject, let's look again at our force diagram, Fig. 10.

We know that the line AB (drawn to scale 1" long) is a force of 1 lb. We want to know the value of the line AC without having to draw the figure to scale. Those old mathematicians that we spoke of a moment ago made up a rule for triangles which said that, in this case, line AB over line AC is equal to the Cosine of the angle at A (45 degrees). Now Cosine is one of those strange-sounding names that I told you the ancient mathematicians assigned to that particular relationship of the two sides of the triangle in question. Remember that we also said, that after many years of endeavor, those old mathematicians made up a set of tables for all the angles. Those tables are very handy; so let's look up the Cosine of 45 degrees. We find that it is 0.7071.

So, we can now write our side relationship in the form of a mathematical equation like this:

$$\frac{AB}{AC} = \text{Cosine 45 degrees} = 0.7071$$

or,

$$\frac{AB}{AC} = 0.7071$$

whence,

$$AB = AC \times 0.7071$$

Now, we want to solve for AC. We know that AB = 1, so we can write our equation like this:

$$1 = 0.7071\ AC$$

$$AC = \frac{1}{0.7071} = 1.4142$$

This is exactly the same value we got when we laid the force diagram out to scale and then measured the length of the line AC. But this way of solving the problem for the value of AC is much more convenient than that of having to draw a force diagram to scale, laying off the angles, drawing in the resultant and measuring it.

Thus you can see, by this example, that force diagrams are very important; and, by use of those old-time mathematicians' rules about triangles and their tables of cosines, such force diagrams can be quickly and easily solved.

Well, all that is very interesting, but what has it got to do with our

study of power factor: It has a lot to do with it; in fact, as we shall see in the next few paragraphs, if we do not understand "force diagrams" and how to solve them mathematically, we can never acquire a full understanding of power factor. Especially is it necessary that we understand about the "cosine" relationship of sides of a triangle, for that is the very "meat" of the mathematical interpretation of power factor.

Kva and Kw

Again, what has all this to do with power factor? Here is the answer to that question: Nearly everywhere that alternating current is generated, it is spoken of, as it comes off the bus bar, as *volt-amperes* or "kilovolt-amperes" or simply as kva. It is not generally spoken of, or referred to, as "kilowatts" or kw.

The reason for employing the term kva rather than kw is that kilowatts represents the *true* power required by the load end of the system whereas kilovolt-amperes represents the *apparent* power required at the load end. The reason we have to distinguish between true power and apparent power is that virtually all alternating current-consuming devices require a certain amount of magnetizing current or magnetizing power to make those devices function. This magnetizing power required is often spoken of as *reactive* power and is abbreviated rkva: reactive kilovolt-amperes. *This rkva does no work.* Thus, for nearly all alternating current-consuming equipment we have three power components: (1) The "true" power actually needed by the device to enable it to perform its job; (2) the "magnetizing" or "reactive" power required to make the device function; (3) the "apparent" power which really is the resultant of the other two.

We may represent these power components by the vectors that we have just studied. And since the power that is actually generated is the "apparent" power required, which we have designated kva, we will draw its vector first. See Fig. 11.

Now, you will recall that we learned that kva (the apparent power) actually consists of the true power and the reactive power. It is, therefore, the resultant combination of the other two.

So, we will start at point A and draw in the true power vector, Fig. 12.

All that remains to complete our force diagram is to connect up point B and point C as in Fig. 13.

That now becomes our BASIC FORCE DIAGRAM for studying, understanding and interpreting power factor.

Let us now take another step: We all know that the actual, true power required for a certain load is established by the load itself and cannot, therefore, be changed as long as the load remains unchanged. That's the point where we have to start from. That value is fixed at the plant. Let us, for example, say that the load at your plant is 100 kw. It actually requires 100 kw to do the job that your plant is set up to do. Then that 100 kw is our basic requirement. It is the actual, true power required by that plant to do its job. So we will draw a vector to represent the true power actually needed of 100 kw like the bottom line of Fig. 14.

But, we later learn that the apparent power coming into the plant, in order to meet that basic requirement of 100 kw of true power, is not 100 kva but 150 kva.

We can represent that value by the diagonal line in Fig. 14.

Then, solving our force diagram, we find that the reactive power represented by the vertical line is equal to 112 rkva.

We said some time back that

$$\text{Power Factor} = \frac{\text{True Power}}{\text{Apparent Power}}$$

$$= \frac{100}{150} = 0.669$$

We also said that the cosine of the angle made by the space relationship of the true and apparent power was the factor known as power factor. If that is so, then we can write:

P F = 0.669 = Cosine angle "A." The angle whose cosine is 0.669 is 48 degrees.

In the trade we speak of this value by saying that the power factor is 66.9 per cent or, roughly, 67 per cent. Thus we have in the plant that we are using as an example, a 67 per cent power factor.

That concludes our basic discussion of power factor: what it is, how it acts, and methods of calculating its effect. Next month we will present common practical problems involving power factor, and tell specifically what it means in the plant.

New Orleans Public Service Expands Market St. Station

As a step in the electric power expansion program being carried out by NEW ORLEANS PUBLIC SERVICE INC., a new turbo-generator, Unit #13, has been installed at the company's Market Street Steam-Electric Generating Station.

The new generator, which has a net capability of 28,000 kw, replaces an old turbo-generator, Unit #6. The new unit has twice the capacity of the old one and is much more efficient.

Unit #6, which was removed to make a way for the new machine, was the first large horizontal generator installed in this section of the country, having been placed in service at the Market Street station on March 7, 1916. It had been in continuous service since then, except for periods of inspection and maintenance.

Many difficult engineering and construction problems were involved in the installation of the new unit between two other generating units while they remained in continuous operation. The project required seven months to complete, during which time there was not a single lost-time accident reported.

Installation cost of Unit #13 is approximately $1,500,000. It increases the net capability of the Market Street station to 200,000 kw, and increases the entire system capacity—including the Industrial Canal station—to 333,000 kw.

Fire does the greatest damage when the victim is unprepared.

Check Your Fire Prevention Program

In late 1951, the South had several spectacular fires with excessive property damage. The K. F. Cline Company, manufacturers of sheet metal products in Nashville, Tennessee, suffered $200,000 in fire damage. About 100 persons were out of work. Another fire occurred in the three-story flooring mill of the Nashville Hardwood Flooring Company destroying between $600,000 and $700,000 worth of lumber and machinery.

In Belsoni, Mississippi, the Belsoni Oil Works, soybean processors, felt the effects of a $150,000 blaze caused by faulty wiring. The Lenoir Pad and Paper Company of Lenoir, North Carolina, was destroyed with $200,000 in fire damage.

By P. C. HENSLER,
Fire Protection Institute

NINETY PER CENT of our fires could be prevented by proper fire safety precautions and correct use of approved fire control equipment.

Properly planned and executed, a continuing fire safety program can help eliminate fire hazards. First, existing hazards must be removed and new ones prevented from arising. Second, sufficient fire control equipment must be on hand to control a small fire.

Too often the protection side of fire safety is minimized with extinguishers classified as "a fire department requirement" rather than a working part of plant safety. Yet these devices have kept many small fires from becoming headline news. Those fires that you don't know about are the ones which were brought under control with fire extinguishers and other fire control equipment.

Many plant fires can be attributed directly to human carelessness. To combat this ever-present obstacle, all employees can be educated in proper fire safety habits.

The Smoking Problem

In areas where combustible materials are found, it is wise to prohibit smoking. If this restriction is necessary, be sure to provide employees with special "smoking rooms" to eliminate the dangers of "sneak smoking." Ash trays and sand urns should be conveniently located throughout areas of the building where smoking is permissible.

Since thirty per cent of all fires can be traced to careless smoking habits, plant operators will do well to make the regulation of smoking a prime concern in their safety programs.

Wiring and Equipment

Defects in electrical units in the plant should be corrected immediately upon discovery. Keep electrical motors free from grease and dirt accumulations and lubricate them regularly to prevent overheating. Check electric wiring regularly for signs of fraying or stripped insulation. At least once a year have a competent electrician inspect the entire plant electrical system.

Defective heating plants score high on the list of plant fire hazards. Steam pipes located too near to woodwork, and corroded or cracked chimneys are sources of many industrial fires. Trouble spots can be isolated and repaired before they cause serious damage. It is always wise to station an approved extinguisher near your furnace for use in emergency should all previous precautions fail.

Sparks from grinding wheels and torches require constant watching. Care can be taken to use this equipment only in areas free of combustible materials. See to it that air ducts and blowers are kept free of dust accumulations since they can easily be ignited by flying sparks.

Housekeeping

One of the best answers to cutting down fire losses in industry is a continuing program of "good housekeeping," throughout the plant. Highly combustible materials such as paint supplies, oily rags and grease waddings can be kept under cover, preferably in tightly-closed metal containers. All too often basements are danger points with packing crates, cartons and excelsior cluttering all available space. Allow ample uncongested space in the aisles of your basement or stock room so that equipment does not block access to important fire doors, fire extinguishers and other fire control equipment. Remove trash accumulations regularly.

Good working conditions and increased production go hand in hand with greater fire safety when a plant is kept clean and orderly.

With trained employees on the scene when trouble does break out, much can be done to safeguard a plant from excessive damage. Industrial plants throughout the country are organizing their own fire - fighting brigades. Brigade members are taught to recognize fire hazards and how to cope with them. They are familiarized with the proper use and care of all fire-fighting equipment on the premises. And they are trained in the methods of evacuating personnel safely from a burning building and are familiar with every escape route.

Properly trained employees and fire safety foresight combined may some day save your plant from complete destruction. Preparedness is the essence of plant fire safety.

User Explains How Armstrong Unit Trapping Boosted Output:

Need for Investment in New Steam Equipment Eliminated by Only $550.00 in Steam Traps

THIS is a story about greatly increased efficiency in a laundry, but the principles involved apply to any plant using steam heated equipment.

In speaking of the benefits derived from Armstrong Unit Trapping, Earl Fast of Soft Water Laundry and Cleaners, Long Beach, California, said, *"It's like a man with dirty eyeglasses—he thinks he's seeing perfectly until he cleans the glasses and finds out what he has missed."*

Mr. Fast's plant modernized its entire return system in 24 hours, installing 71 Armstrong traps costing about $550, with these results:

1. Capacity of machines costing as much as $15,000 per unit increased to the extent that new machines are not now required.
2. Higher quality of ironing and finishing, with touch-up on shirts eliminated.
3. Worthwhile fuel savings.

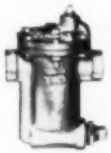
"Our boiler was turning out plenty of steam," continued Mr. Fast, "but we weren't getting the benefit of it. The best power plant in the world is of no value if you don't use its produced steam to maximum efficiency."

And there lies the case for Armstrong Unit Trapping, which discharges air and condensate as fast as it accumulates to keep steam heated equipment hot and producing at a peak rate. Your local Armstrong Representative will be glad to survey your condensate drainage system without obligation. Call him or write:

ARMSTRONG MACHINE WORKS

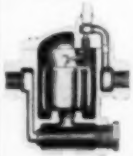
806 Maple Street • Three Rivers, Michigan

Traps with Built-in Strainers Cut Costs



Because the piping at Soft Water Laundry was old, the smallest-sized traps needed protection against dirt and scale. Armstrong No. 880 and 881 traps with built-in strainers were the logical answer because:

1. They cost less than a separate trap plus a strainer.
2. They eliminate external fittings and considerable installation labor.



Left—Cut-away view showing strainer screen at trap inlet. Strainer can be cleaned without removing or shutting off steam.

You always get more out of equipment when you use Armstrong "Unit Trapping"

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44-PAGE STEAM TRAP BOOK
Gives Complete Information
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FILL IN AND CLIP TO YOUR COMPANY LETTERHEAD

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Please send me a Steam Trap Book.

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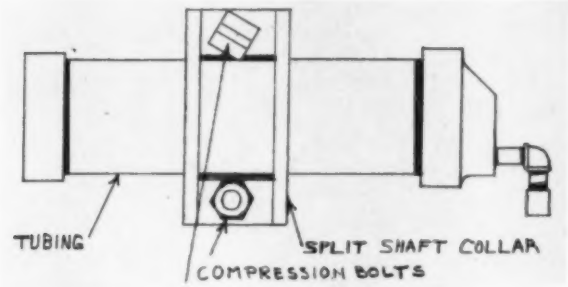
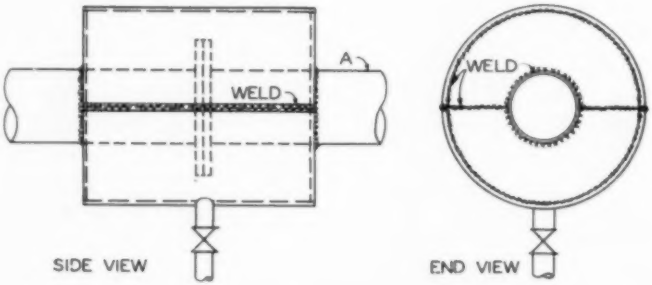
HELPING the *MAN-IN-THE-PLANT*

ideas . . . tools . . . methods . . . devices



Shop-Made Tubing Clamp

A CLAMP, made as shown by boring a suitably sized split shaft collar to proper size, provides a means of holding thin walled tubing or small cylinders without crushing. The collar can be held in a chain vise.—*Thomas Trail, Maryland.*



Emergency Flange and Pipe Repairs

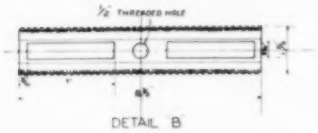
WHEN a regular repair job on a leaking pipe line would cause a plant shutdown, it can be frequently repaired in the manner illustrated.

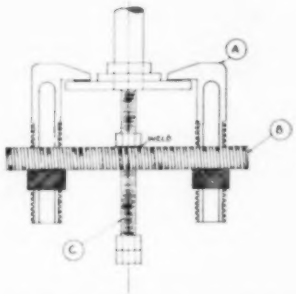
Cut a section from a pipe considerably larger than the pipe to be repaired and two or three feet long. Cut and weld sections of steel plate into each end, leaving a hole slightly larger than the pipe "A," as illustrated.

Cut the larger pipe into two sections to secure the proper bevel for welding. This can be accomplished with a planer or cutting torch. Weld a nipple with a valve of the size deemed necessary, into the lower section, leaving the valve open. Weld this section onto the pipe marked "A." Then weld the two sections together and to the pipe. Close the valve and the pipe will function as usual. The method can also be used for flange leakage.—*Chas. W. Fuller, Florida.*

Gear-Coupling Puller

WHEN confronted with a coupling on a pump shaft that we were unable to move with conventional pullers, the illustrated gear or coupling puller was constructed.





A—No. 14 Stillson pipe wrench jaw; B—No. 36 Stillson pipe wrench jaw; and C—½-in. bolt, 6-in. long and three hex nuts.

The puller jaws are slipped over the coupling and the knurled nuts on the jaws adjusted until the bar is parallel with the coupling. Pressure is applied by turning the 6-in. center bolt against the center of the pump shaft until the frozen coupling or gear is removed. With the exception of the center bolt, the device was made entirely from discarded Stillson wrenches.—*Tom Siefkes, The Shamrock Oil and Gas Corporation, McKee Plants, Sunray, Texas.*

This helping the man-in-the-plant item was submitted as an Operating Kink entry in the Amarillo, Texas Panhandle-Plains Regional Meeting of the *Natural Gasoline Association of America* and is published through the courtesy of the association's secretary, William F. Lowe, Tulsa, Oklahoma.

TOP HONORS TO THESE R.E.A. PLANTS:

Another Example of Efficient Power at Lower Cost

★ GRAHAM COUNTY ELECTRIC CO-OP., INC.
PIMA, ARIZONA

★ WESTERN MINNESOTA POWER COOPERATIVE
BENSON, MINNESOTA

★ CLAY ELECTRIC COOPERATIVE, INC.
WORTHINGTON SPRINGS, FLORIDA

...and they're all Cooper-Bessemer powered!

THE Diesel Progress 1951 annual award, for the most efficiently operated R.E.A. plant, goes to Graham County Electric Co-op whose plant and engines are shown here. And there's a lot of significance in what Manager Howard Helmers has to say . . . "*Our engines and equipment have given remarkable performance and have required a minimum of maintenance.*"

That pretty well sums up the story in Cooper-Bessemer powered plants generally . . . and explains why the second and third honors likewise went to plants equipped with Cooper-Bessemers.

In the Graham County Electric Co-op plant, for instance, 5 supercharged Cooper-Bessemer gas-diesels are generating power at a total fuel and lube cost of only 3.08 mills per kilowatt hour.

Cooper-Bessemer diesels, gas-diesels and gas engines are built for every kind of heavy-duty stationary or mobile service. Why not check with the nearest Cooper-Bessemer office about your power needs?

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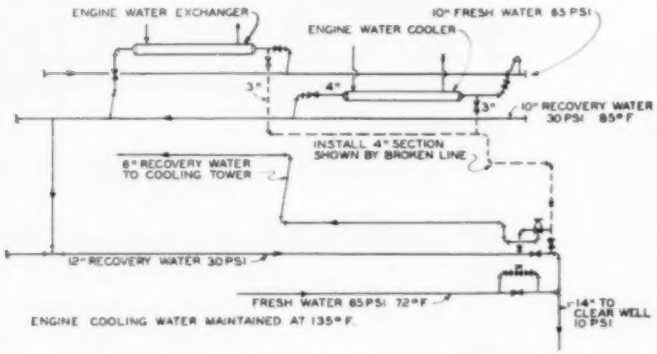
More Uniform Engine Water Temperature

BY utilizing recovered water in place of fresh water in the compressor gas engine cooling water exchangers in one of our compressor stations, we secured more uniform engine water temperature and a possible reduction in corrosion rate.


ENGINE WATER EXCHANGER
10" FRESH WATER 65 PSI
ENGINE WATER COOLER
3"
4"
3"
10" RECOVERY WATER 30 PSI 85° F
INSTALL 4" SECTION SHOWN BY BROKEN LINE
8" RECOVERY WATER TO COOLING TOWER
12" RECOVERY WATER 30 PSI
FRESH WATER 65 PSI 72° F
14" TO CLEAR WELL 10 PSI
ENGINE COOLING WATER MAINTAINED AT 135° F.

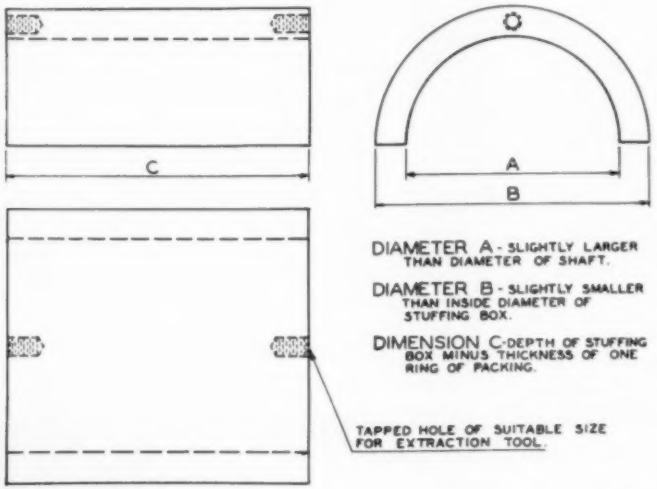
Connection, as described above, eliminates pumping 150 gpm of fresh water. Corrosion is less severe in the exchanger and piping due to lower flow of fresh water. Water flow through exchangers is not affected by filter backwash. It provides better control of cooling water flow and maintains engine jacket temperatures at a uniform level.

A 3 in. connection to the inlet water side of the exchanger (see illustration) was made between the inlet and block valve. The 3 in. connections were tied to a 4 in. header and the header connected to the supply line on the downstream side of the level regulator. The inlet to the exchanger was blocked off and the flow of water reversed.

Prior to the modification, fresh water entered the coolers under a pressure of about 65 psi and discharged into the recovered water header at a pressure of 30 psi. The new lines were installed in the recovered water line where the pressure is about 10 psi, which is adequate to insure a sufficient flow of water.—*Clifford McClesky, utilities department, Humble Oil & Refining Company, Baytown Refinery, Baytown, Texas.*

Pump Shaft Packing Tool

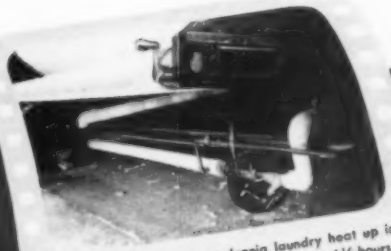
MECHANICS who understand how to pack centrifugal pumps know that a satisfactory job can't be done by jamming the stuffing box full of packing and then crowding it up with the gland follower. The experts know that each ring of packing must be cut carefully to fit and then individually pushed into its proper position. The outcome of the *jamming* method is that the last ring of packing gets too much pressure from the gland follower whereas the inner rings don't get enough pressure.


C
A
B
DIAMETER A - SLIGHTLY LARGER THAN DIAMETER OF SHAFT.
DIAMETER B - SLIGHTLY SMALLER THAN INSIDE DIAMETER OF STUFFING BOX.
DIMENSION C-DEPTH OF STUFFING BOX MINUS THICKNESS OF ONE RING OF PACKING.
TAPPED HOLE OF SUITABLE SIZE FOR EXTRACTION TOOL.

To facilitate the pump packing job the tools illustrated should be made up and kept with the packing and other packing tools. The sketch is largely self-explanatory. The tool consists of two pieces which when put together around the pump shaft serve as a pusher. By their use the packing rings may be slid along the shaft deep into the stuffing box. When necessary the gland follower may be used to exert pressure to push the rings home. A set of these tools should be made up for each size of pump shaft and stuffing box. For the smaller pumps it might be feasible to make the pushers out of scraps of steel pipe or discarded pump shaft sleeves.

Anyone who has used this handy tool will agree that it is much easier to do a good job with it than with sticks of wood, screwdrivers or other makeshifts.—*T. M. Johns.*

steam trap trial shows how to increase production



Flat-work ironers in Pennsylvania laundry heat up in 15 min. with Yarway traps instead of previous 1½ hours.

West Coast Rubber molding plant cut heating cycle on presses from 15 minutes to 8 minutes by using Yarway traps.

Kettles in New England hospital kitchen reach cooking temperature in 12 minutes with Yarways instead of previous 25 minutes.

Southern textile mill gets satisfactory slasher production for first time due to faster heating-up with Yarway traps.

These 4 plants—each in a different industry—have something in common. Each installed a Yarway Impulse Steam Trap on a trial basis—and after witnessing the production-boosting results, they standardized on Yarway traps.

Experiences like these are found in hundreds of plants because Yarways are *designed* to get equipment *hot in a hurry,* and therefore into production fast.

Coupled with other Yarway Impulse Steam Trap advantages like small size, easy installation, stainless steel construction, easy maintenance and low cost—it explains why more than 800,000 Yarways have already been installed.

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the steam trap designed with more production in mind

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Southern Representative: ROGER A. MARTIN, Bona Allen Building, Atlanta 3, Ga.

Procedures that improve production only a little are of big value in overall plant economy. Ideas, kinks, tools, devices, new methods, etc., are big items collectively.

Bandsaw Versatility

By JOHN E. HYLER

BANDSAWS of different types have a wider scope of application than realized by the average mechanic. Recent years have seen the development of the contour type of metal-cutting bandsaw for friction sawing. Friction sawing is older than its bandsaw application, having been practiced on heavy structural shapes, in particular, using circular saw blades on heavy machines designed for this purpose. Making the contour-cutting bandsaw adaptable for the same purpose has been a distinct forward step for industry; the friction-sawing process allows cutting metal at a far higher rate of speed.

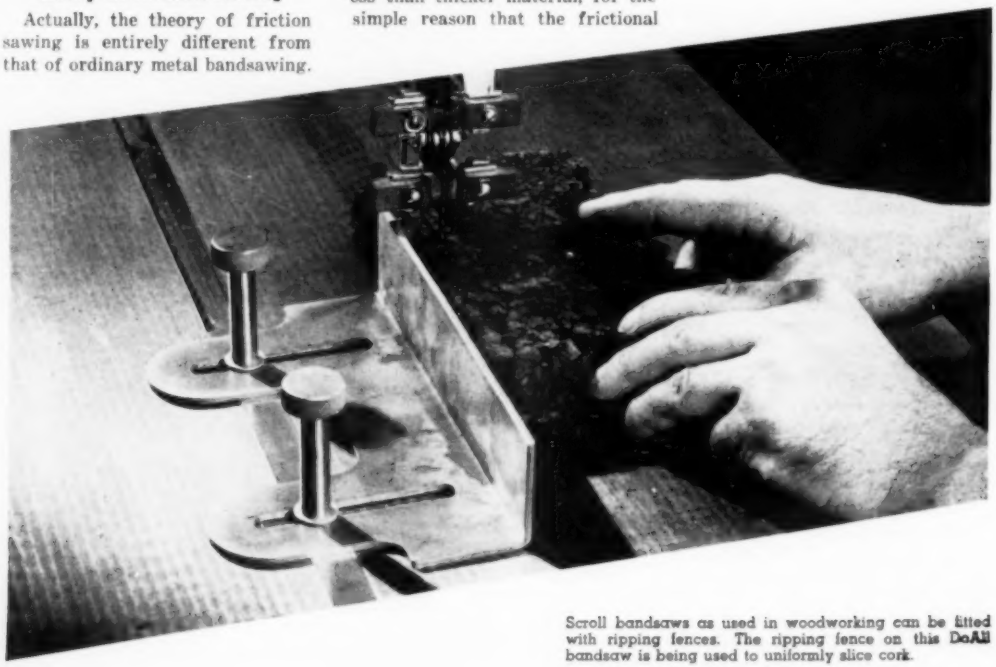
Theory of Friction Sawing

Actually, the theory of friction sawing is entirely different from that of ordinary metal bandsawing. It is based on running a bandsaw blade at high speed, and exerting enough pressure against the blade with the metal being cut, to heat the metal highly just at the point of tooth contact. Enough heat is built up at this point to soften the metal, and thus make it amenable to ready cutting, even with dull saw teeth. In fact, dull or blunt teeth are designedly used on a friction cutting blade. Their greater area of contact with the work creates more friction and more resultant heat, thus making them more efficient for this type of work than sharp saw teeth could be.

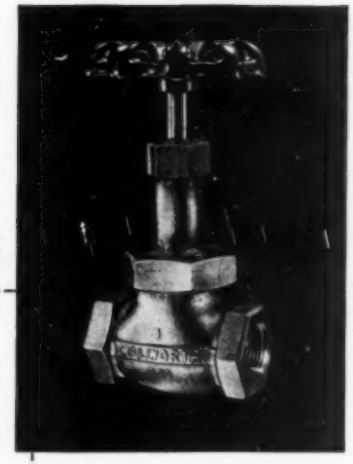
Thin stock cuts more efficiently by the friction bandsawing process than thicker material, for the simple reason that the frictional heat is more widely distributed as the stock becomes thicker. Thus, greater pressure must be used against the toothed edge of the saw blade as the material graduates upward in thicknesses, in order to obtain the right amount of heat for really efficient cutting. Material ½ in. or ¾ in. thick is about the maximum that can be friction sawn with a bandsaw blade to advantage, unless a special rocking technique is employed. If provision is made for rocking heavier pieces first forward and then backward, so the saw teeth are not cutting over the full thickness for any appreciable part of the time, efficiency is fairly well maintained. Such rocking, however, is feasible only on pieces of relatively small cross section, or area.

Skip Tooth Blades

On jobs where very thick wood is being cut with a scroll bandsaw, it has long been noted that the work cannot be crowded without causing the blade to weave in the cut. The reason is that a standard wood bandsaw blade, with its teeth spaced quite closely together, does not have sufficiently large



Scroll bandsaws as used in woodworking can be fitted with ripping fences. The ripping fence on this DoAll bandsaw is being used to uniformly slice cork.



take a good look at the Walworth "500 Brinell" no. 225P Globe

IDENTIFICATION DISC: An aluminum marking plate on all Walworth No. 225P's facilitates inventory control and makes reordering quick and positive.

NEWLY DESIGNED HANDWHEEL: Patented air-cooled, finger-fit handwheel affords sure grip even with greasy gloves.

IMPROVED PACKING: Molded packing of lubricated asbestos reinforced with copper wire. Suitable for practically every service. Valves can be repacked under pressure when fully opened.

– the Toughest Bronze Valve Your Money Can Buy

The stainless steel, corrosion resistant seats and discs are heat treated to a hardness of 500 Brinell – hard enough to scratch glass and crush nails! The valve can be closed on sand, slag, and pipe scale without injury to the seating surfaces. "Wire drawing" is practically eliminated. All parts are accurately machined and gaged. Years of tight, positive shut-off are assured.

Available in both globe and angle types (angle type: No. 227P) in sizes ¼" to 2", this quality valve is recommended for 350 lbs. W.S.P. at 550 F, and 1000 lbs. non-shock service on cold water, oil, gas, or air.

For full data on this long-life, economical Walworth Bronze Valve, see your local Walworth distributor, or write for Circular.

note these 7 Great Features

HEXAGONAL UNION BONNET CONNECTION, DEEP STUFFING BOX AND RUGGED STUFFING NUT: Union bonnet connection eliminates any chance of distortion or leakage even though valve is repeatedly taken apart and reassembled.

OVERSIZE STEM: The high-tensile strength silicon-bronze stem assures long life and protection against wear.

SEATS AND DISCS: Plug type seats and discs of stainless steel, heat-treated to 500 Brinell hardness and machined simultaneously to a mirror-like finish, with accurate tapers assures tight positive shut-off with minimum handwheel effort.

EXTRA STRONG BODY: Made of Composition M (ASTM B61) bronze. Thick walls and rugged hexes provide a high safety factor. Valves undergo hydrostatic shell test of 8,000 psi.

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gullets between the teeth to carry a full complement of sawdust, if very thick work is advanced to the blade at a normal rate. Evidently, each gullet must have sufficient sawdust-carrying capacity to hold all the sawdust cut by the tooth following it, from the time that tooth enters the wood until it leaves it. This problem has been solved through the use of skip-tooth blades with only about half as many teeth. These blades have correspondingly more gullet or sawdust room for each tooth on the blade.

Some bandsaws for the metal-working trades, designed particularly for die work and other internal cutting, incorporate a butt welder. A length of bandsaw blade can be threaded through a hole drilled in the work where the hole is to be cut, after which the two ends of the bandsaw blade can be butt welded, the weld annealed, and the saw placed on the wheels of the machine, ready for cutting. After the cut is complete, the bandsaw blade may be broken to remove it from the work. There are many cases in which this technique is used to high advantage. Many bandsaws employed for tool and die work are also designed so they will carry continuous file bands in place of the bandsaw blade, after the sawing has been done and it is desired to file the work smooth. Some bands have also been made for running on these machines, which will carry a series of abrasive stones. This makes it possible to provide an even greater degree of smoothness on the work.

Many Materials Sawed

Bandsaws are used for cutting many different kinds of material. Knife blade bands may be used on the bandsaw wheels, which will do a perfect job on such materials as sponge rubber. Paper cores for wound coils have been rapidly cut on a bandsaw using a special scallop-type blade. Imagine slicing up meteorites! This has been readily accomplished by experts of the Department of Geology at the United States Museum in Washington. This dense material has been sliced with a toothless bandsaw traveling at 950 fpm, using silicon carbide and water in connection with the blade for the purpose. Whether one may accurately call this a sawing job or not, it is accomplished with a bandsaw.

Traveling Actions of Bandsaws

Different bandsaws have been built and put into use which have a traveling action of the frame carrying the wheels and the blade, to swing the running blade into the cut. One such saw has a special guide which turns the bandsaw blade to a position 90 deg removed from the one it would normally occupy, for making the cut. This machine is used in the woodworking industries for fast reduction of logs to short bolts. Other and somewhat similar swinging bandsaws are used for cutting off metal. These also have their blade guided or twisted out of its normal course for making the cut, but not to a position so far removed from normal, since metal stock cut with them is much smaller in cross section, and not so much scope is needed.

Other Applications

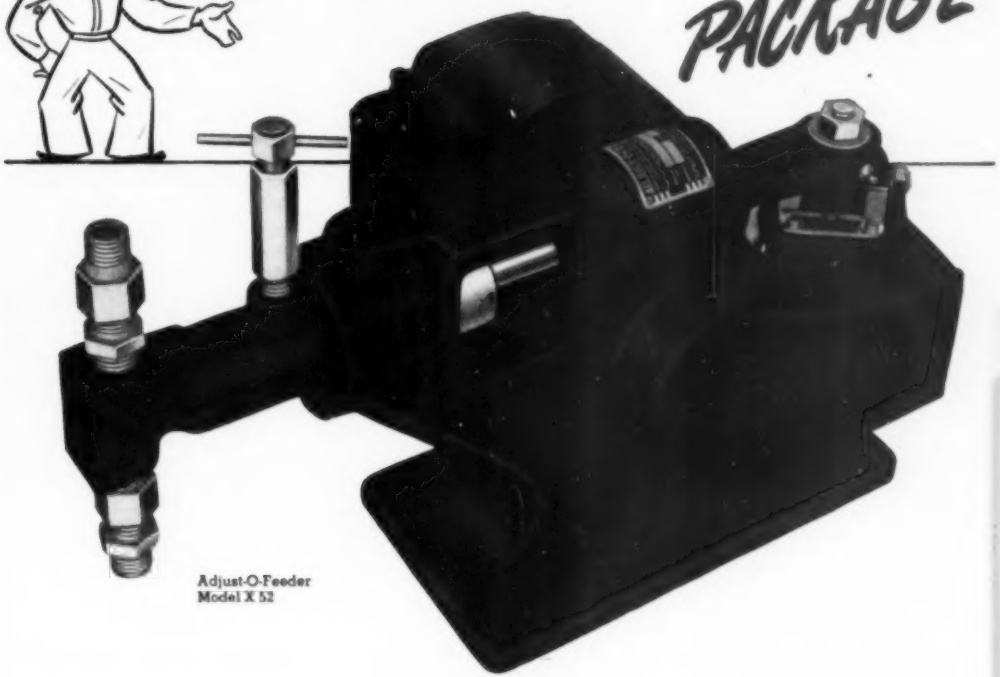
Another bandsaw, considerably used for variety metal cutting at various miters and bevels, has facilities for tilting the bandsaw frame either to the right or left, as much as 45 deg or any part thereof, and locking it in selected position, after which it may be traveled over ways which are an integral part of the machine, to make the cut.

So far, we have only known of one practical instance in which a complete bandsawing machine is traversed as a unit for making a cut. This is seen in one of the illustrations, where a portable woodworking bandsaw is mounted on a special truck with its driving motor. The truck has flanged wheels, and runs on a short track installed for the purpose. This unit is employed for trimming the ends of laid-up packages of green plywood panels, making them even before they are placed into a hot plate press for curing.

This DoAll saw is engaged in the friction sawing of bus fenders. Saw velocity is 6500 fpm and complete trimming time 1.7 minutes. Only a very slight burr is left on the work.

The small bandsaw in the foreground is truck-mounted. To trim the ragged ends of the plywood charge, the unit is pushed along the short track.

NEW BOILER WATER CONDITIONING PACKAGE



Adjust-O-Feeder
Model X 52

- LOW COST
- COMPACT
  Built-in standard motor — no separate gearbox or couplings.
  Built-in oil-enclosed gear reducer.
- MICRO-STROKE ADJUSTMENT
  Scale easily read — crank and connecting rod operate in horizontal plane.
- LONG LIFE AND EASY MAINTENANCE
  One-piece Meehanite iron frame for positive alignment of all moving parts.
  Double check valves on suction and discharge easily removable.

This new, compact chemical feed pump, by %Proportioneers, Inc.%, is inexpensive and provides accurate boiler water treatment for plants where a low capacity, medium pressure pump will meet requirements. The standard Model X 52 has a capacity range from 1 to 10 GPH and will discharge against pressures up to 650 psig. For lower feeds, the unit is available with a range of from 0.5 to 5 GPH. Complete and self-contained, Model X 52 weighs less than 100 lbs. and is ready to operate as soon as piping and motor are connected.

Ask for Bulletin 1105

% PROPORTIONEERS, INC. %

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Technical service representatives in principal cities of the United States, Canada, Mexico and other foreign countries.

Insulation Repairs

INSULATION maintenance is a neglected factor in many plants and often leads to costly heat losses or operating inefficiencies. The Magnesia Insulation Manufacturers Association points out that the need for maintenance may result from normal wear and tear, from failure to repair or replace insulation damaged or removed during alterations, or from routine equipment maintenance work.

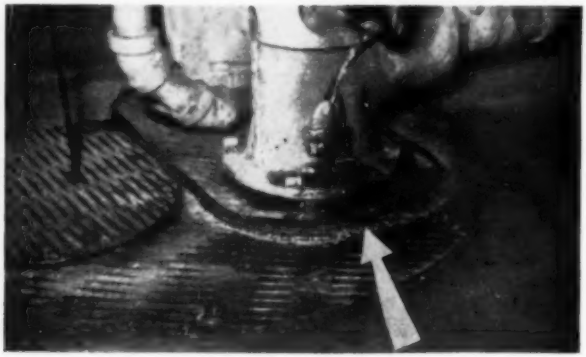
Most frequently, the need for insulation repair on pipe lines can be noticed around flanges and fittings which are opened for inspection or other purposes. Pipe insulation adjacent to chain hoists, doors or other moving objects may be damaged if not properly protected. Loose tie wires or bands and damaged canvas covering should be checked and repaired. Small fittings insulated with cement are more likely to need periodic reinsulation than pipes and larger fittings having molded insulation.

Typical service opening in equipment where insulation is subject to damage during maintenance operations. Notice bevel of insulation around bolted cover to allow for easy removal.

Equipment is likely to show most need of insulation repair around manholes or other openings where the edges are subject to hard contact and abrasion. Vibrating or rotating equipment, when insulated, should be checked frequently to assure the soundness of the fastenings. Loose tie wires or sheared stud welds may allow the insulation to sag or become completely detached.

One of the factors causing neglect of insulation maintenance is the need for stocking insulation materials of various types and sizes such as blocks, pipe sections, cement, canvas, wires and bands. This problem can be solved by arranging with an insulation contractor for periodic inspection and maintenance. Plants using such service, it is said, find that it more than pays for itself through prolonged life of the insulation and added fuel savings.

For those who prefer to do their own insulation maintenance, a 96-page manual describing and illustrating applications and maintenance techniques can be obtained by writing The Magnesia Insulation Manufacturers Association, 1317 F Street, N.W., Washington 4, D. C.



Sump Pump Drain

SOME electric sump pumps are mounted on flat steel plates. Unless such a pump is fitted with a suitable drain to carry off leakage from the shaft stuffing box, the floor in the vicinity of the pump will likely be flooded at times, thus creating a hazardous condition.

A simple remedy consists in welding a narrow strip of bar or flat steel to the plate to form a dike, as shown in the accompanying illustration. The strip of metal is bent to a shape that will completely encircle the base of the pump or pumps and the ends are welded together. Then the edge of the strip is welded to the plate to form a water-tight joint. One or more holes drilled through the plate where the liquid collects will serve as drains to the pit below.—*Thomas Trail.*

Sparkless Commutation

FIND the engineer who does not like to see his commutators gleaming like a new gun barrel. Sparkless commutation is much desired but is not always easily achieved, once trouble sets in. Much depends on the brush holders being set accurately since slight maladjustment of the studs spells heavy trouble.

Stagger the brushes on pairs of studs so that one pair rides on the space between the brushes in an adjacent pair. This distributes the brush wear evenly across the commutator so that no grooves or ridges develop. Brushes of the same polarity should not track each other, since the wear on the commutator as current flows from the brushes into the commutator varies greatly from the wear produced as the current flows from the commutator to the brushes.

As a rule the brush holders should be spaced about ⅛ in. from the commutator. To do this accur-

Wagner
ELECTRIC MOTORS
... the choice of leaders in industry

Wagner Quality Motors *for your product or your plant*

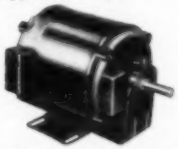
When you select a motor from Wagner's complete line, you get a motor that is completely dependable in its specific application. You can choose from a wide variety of types and sizes. Here are a few of the motors in the Wagner line. At right is TYPE RP—open type polyphase squirrel-cage motor. It is drip-proof and suitable for all general purpose applications. 1/6 to 400 hp.

SINGLE-PHASE

TYPE RB—*Split-phase Induction. For easy starting applications with high starting current. 1/20 to ½ hp.*

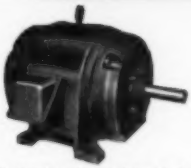
TYPE RK—*Capacitor-Start Induction. For general purpose applications requiring high starting torque—normal starting current. 1/6 to 3 hp.*

TYPE RG—*Repulsion-Induction. For high starting torque applications involving a very long starting period. 1 to 5 hp.*



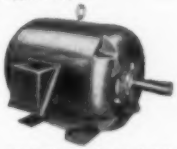
TYPE RA—*Repulsion-Start Induction. For general purpose applications with high starting torque—low starting current. ½ to 15 hp.*

POLYPHASE MOTORS



TYPE XP—*Splashproof. Protected against splashing or dripping liquids. ½ to 200 hp.*

TYPE TP—*Totally-enclosed, non-ventilated. Fully protected. ¼ to 15 hp.*



TYPE CP—*Totally-Enclosed Fan-Cooled. Protected against dirt, chips, abrasives or fumes. Steel frame. 1 to 250 hp. Also in explosion proof type HP.*

TYPE EP—*Corrosion-resistant Totally-Enclosed Fan-Cooled. Cast iron frame. 2 to 250 hp. Also available in explosion proof type JP.*

TYPE RS-1—*Wound Rotor. Constant or adjustable varying speed. 1 to 250 hp. TYPE RS-2 for intermittent service. 2 to 200 hp.*

GEAR MOTORS—*Single-phase or Polyphase. Open or enclosed types. 1/20 to 50 hp.*

DIRECT CURRENT MOTORS—*Companion line to Wagner A.C. Motors. 1/6 to 3 hp.*

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In addition to a complete line of motors, Wagner also furnishes Increment Type Motor and Starter Combinations, Jet Pump Motors and a complete line of Transformers: Dry-type, Distribution and Power. Wagner engineers welcome an opportunity to serve you. Consult the nearest of 32 Branch offices, or write direct.

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Many new B&W boilers are under construction and on order to supply steam requirements for several million kilowatts of new generating capacity.

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Keeping pace with the nation's continuing industrial expansion, The Babcock & Wilcox Company is completing this year a multi-million-dollar increase in facilities for the manufacture of boilers for electric generating stations, industrial plants, institutions, public buildings and apartment houses, chemical plants, oil refineries, and merchant and naval vessels.

Two new plants are already in production at Wilmington, N. C. and West Point, Miss. A third one is being built at Paris, Texas. Thousands of additional employees have been trained to man these new plants, and to work expanded fabricating facilities at five other B&W plants. New machines and processes . . . including the world's largest boiler plate press . . . are setting new standards of production efficiency and speed.

Through its expanded facilities for production of more steam generating equipment, B&W shares in America's dynamic urge to accomplish as reflected in industry's phenomenal, growing capacity to mass produce.

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ately use a strip of fibre on which the holder is set down as the tightening is done at that distance.

To lay out brush spacing use a strip of paper securely laid around the commutator, and note on it the exact commutator circumference. Lay the paper on the drawing board and divide the circumference "length" into as many divisions as there are brush groups. With a square lay off the lines across the paper at each division to determine the location for the brushes. After the brush assembly is set according to this layout it will be fairly accurately spaced about the commutator. Small inaccuracies in the brush assembly may be accumulative, however and cause an appreciable error in the brush spacing.—*Paul C. Ziemke, Oak Ridge, Tenn.*

Yard Container for Extinguishers

A STURDY container for the 5-gallon hand extinguisher consists of a length of 2½ in. pipe—or other conveniently available size—set in concrete and topped with a cylinder of 8 in. pipe with flush welded top and bottom plates. A door to provide access to the extinguisher is cut with the torch in one side of the 8 in., and then attached along one side with a pair of heavy hinges.

The holder, painted red, is readily recognized in an emergency, and with its fitted cover, amply protects the unit from weather.—*Elton Sterrett, Houston, Texas.*

Clamping Device for Machine Jobs

THE illustrated clamping device has considerably reduced the time required to set up a machine job in the mechanical maintenance shop of Esso's Louisiana Division operations at Baton Rouge.

It consists of an adjustable hinged jaw, which is equipped with a thick base plate and clamping screw. The clamp can be used on any slotted machine table or face plate which is equipped with plate openings for clamping tools and eliminates the various types of makeshift arrangements formerly used to secure work on the machine tables.—*John W. Dunn, Machinist Department, Esso Standard Oil Company, Baton Rouge, Louisiana.*

Data courtesy of *D. J. Hurst* and *Allen B. Smith* of Esso Standard Oil Company's Louisiana Division.

Fred Hosch of the Gas Distribution Division of *New Orleans Public Service Company's Gas Department*, was one of the recent winners of the company's extensive "New Ideas Mean Progress" program.

Rubber Matting Solves File Slippage Problem

HOW an employee came up with a wrinkle to provide ridged rubber matting in card files, along the bottom, so as to provide enough traction between the card and the bottom of the file, was reported in a recent issue of *The Gasette*, publication of the New Orleans Public Service Company.

The idea, suggested by Fred Hosch, record clerk in the Gas Distribution Division, permits blocks of cards to be taken out without the cards slipping and falling when the file drawers are opened and closed. Matting eliminates a difficulty of long standing and is placed in card files when needed.

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Send your ideas, methods and short-cuts to *Southern Power & Industry*. Payment is made for suitable material — a photo or rough sketch will make your idea more valuable. Articles from maintenance and production men in Southern and Southwestern plants are preferred. Material must not have appeared elsewhere nor been sent to another publication.

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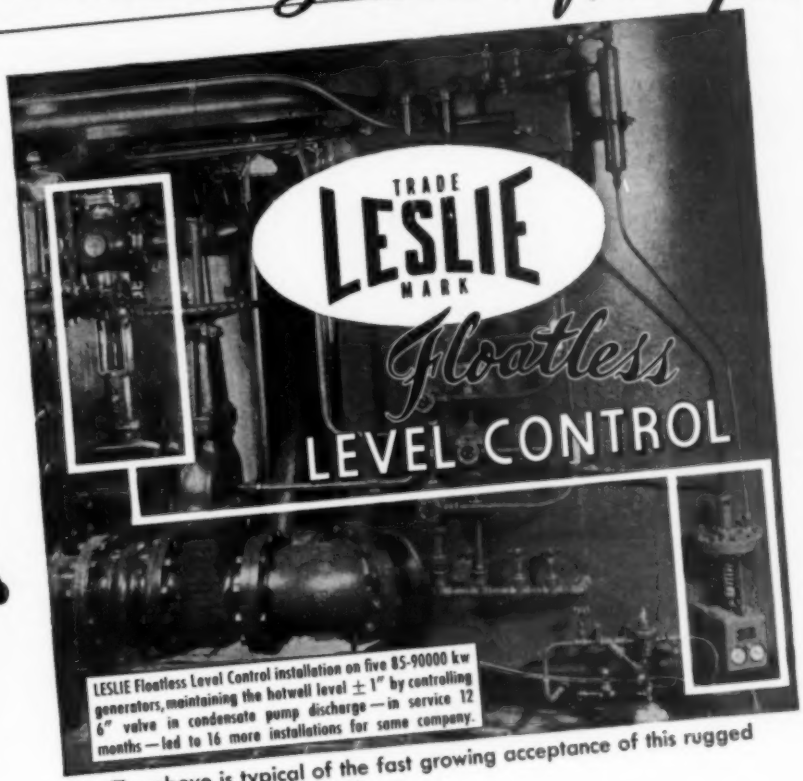

LESLIE Floatless Level Control installation on five 85-90000 kw generators, maintaining the hotwell level ± 1" by controlling 6" valve in condensate pump discharge — in service 12 months — led to 16 more installations for same company.

The above is typical of the fast growing acceptance of this rugged and accurate level control.

ADVANTAGES

- EASY TO INSTALL
- ACCURATE REGULATION (± 1" Water Column)
- NO FLOATS, STUFFING BOXES, ETC.
- MULTI-MEDIUM ACTUATED
- DIAPHRAGM PRESSURE ELEMENT
- ACTION REVERSIBLE

Applications: On open and pressurized vessels, including boilers, tanks, evaporators, heaters, standpipes, etc.

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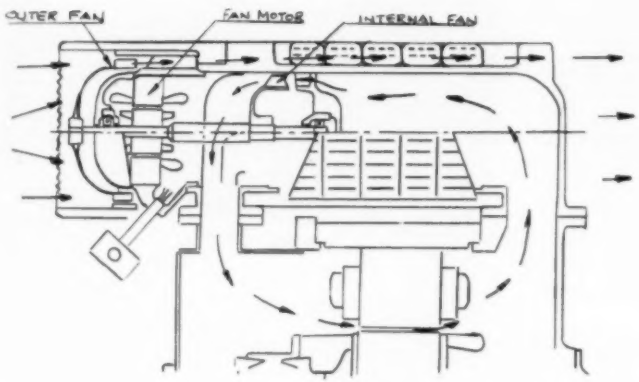
new equipment (continued)—starts on page 8

Free additional information is available to readers of Southern Power & Industry. Check item number on the postage free service coupon post card—page 17.

workers can easily strap packages at high volumes and to uniform strap tensions without fatigue.

The machine is electrically powered and electronically controlled. Its welding circuit uses 230-volt, 60-cycle, single-phase current. Its control circuit uses 115-volt, 60-cycle, single-phase current.

This new line of strapping machines can be furnished to accommodate strap sizes in widths of ⅜, ½, ⅝, and ¾ in. and in thicknesses up to .023 in. A full range of strap tensions up to 750 lb can be obtained. The welded strap joint consists of two spot welds. The design and operation of the machine eliminates the possibility of strap waste on overlap around the welded joint.



Ventilation scheme, *Reliance Electric & Engineering Company's* Type T, d-c, motors. Unit was designed to answer need for a totally-enclosed motor which by virtue of special cooling provisions could be built in relatively large horsepower ratings for applications where it is necessary for the motor to be given extra protection from atmospheric conditions.

Totally-Enclosed Dual-Cooled Motor

J-5 RELIANCE ELECTRIC & ENGINEERING COMPANY, 1088 Ivanhoe Rd., Cleveland 10, Ohio, has developed what might be termed a totally-enclosed, dual cooled motor, equipped with a heat exchanger as an integral part of its own frame.

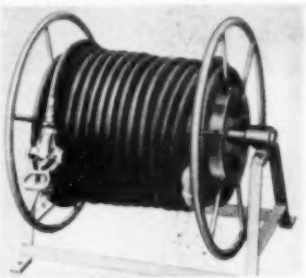
A 1½ hp, 3 phase, 60 cycle motor, built into the heat exchanger, runs at 3600 rpm to drive internal and external fans independently of the main motor itself.

Heat exchanger sections are cast aluminum with both internal and external fins for maximum heat dissipation. Air velocity through the internal sections of the exchanger is 2900 fpm. In the external path between the cover and the exchanger bank the air is pumped at 3300 fpm.

New design simplifies maintenance. Use of wide exposed aluminum fins, plus the high velocity at which the air is swept past them, tends to keep them clean. Should they become fouled with foreign matter, they can still be easily cleaned inasmuch as removal of the cover makes the exposed fins readily accessible. New units are available in sizes up to 150 hp with Underwriters and Bureau of Mines approval.

Continuous Flow Hose Reel

J-6 WIRT & KNOX MFG. CO., Sedgley Ave., York & 23rd Sts., Philadelphia 32, Pa., has developed a new, continuous flow hose reel for fighting fires instantly and keeping water damage to a minimum.



Water pressure is available at the hose nozzle even when the hose is coiled on the reel.

With the new reel, time is saved because water pressure is available at the hose nozzle even when the hose is coiled on the reel. A swivel joint connection in the pipe line permits application of a full stream of water on the fire while the hose is being unreeled. This eliminates the time required to turn on the valve after the hose is run out. The kinks and tangles so often encountered when dry hoses are removed from reels or hangers are eliminated together with the time required to straighten them.

New Prepaint Metal Cleaner

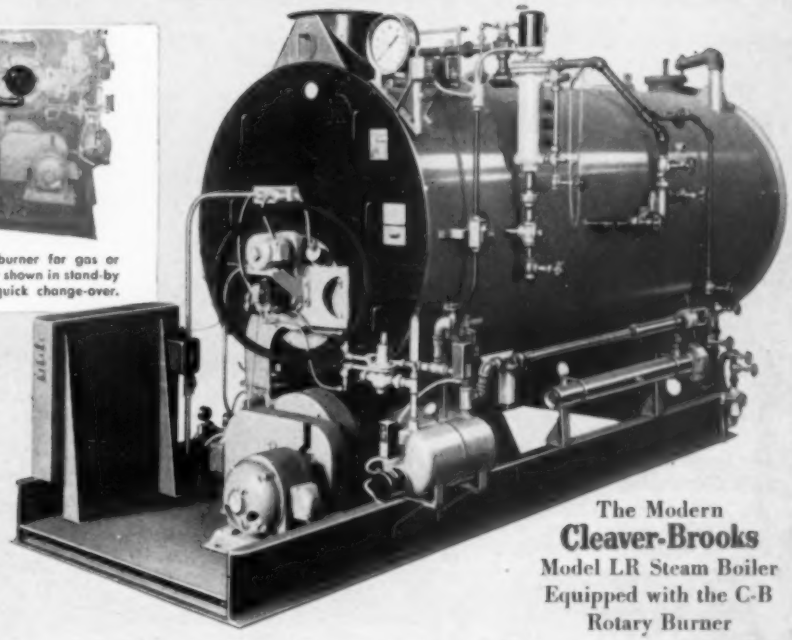
J-7 OAKITE PRODUCTS, INC., 123A Rector St., New York 6, N. Y., has announced production of a new metal cleaner, Oakite Compound No. 31, which cleans, derusts and phosphates in a single operation.

The compound is a highly concentrated, liquid detergent which can be diluted up to 25 per cent by volume for economical prepaint treatment of metal by dipping or hand-swabbing methods. Besides preparing metal for paint, it has detergent properties that effectively remove light soils as well as soldering and welding fluxes. It also possesses acid ingredients which remove rust, heat scale, tarnish and other oxides.

In preparation for painting, Oakite Compound No. 31 microscopically etches steel and cast iron, and converts the surface layer of metal into a thin film of insoluble phosphates. The etching and conditioning action

unmatched Flexibility of operation ...and of quick fuel change-over

Combination burner for gas or oil. Oil burner shown in stand-by position for quick change-over.



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Install a Cleaver-Brooks Boiler — oil, gas, or combination — either fuel properly proportioned by the exclusive Cleaver-Brooks Burner to meet your fluctuating or constant steam demand. Fully automatic, clean, with a single source for all of its matched parts . . . you benefit with lower fuel bills, less maintenance, reduced operating costs, greater profits. Why not consider changing your present boiler plant and think of flexibility — remember Cleaver-Brooks and get the complete facts on boilers, 15 to 500 HP — 15 to 250 lbs. psi.

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Builders of Equipment for the Generation and Utilization of Heat • Steam Boilers • Oil and Bitumen Tank-Car Heaters • Distillation Equipment • Oil and Gas-Fired Conversion Burners

on aluminum sheet and aluminum castings is similar, with the adhesion of paint to metal being improved. The inert film deposited by this material also prevents the spread of rust when painted surfaces become scratched or gouged—rusting is confined to the exposed area of metal, only.

Machinery Leveling Device

J-8 THE FILTER & INJECTOR COMPANY, 1001 South Broadway, Springfield, Missouri, announces the development of a patented device for leveling heavy machinery, to be marketed under the trade name "Lev-ler."

The instruments are scientifically engineered to assure easy, accurate and economical machine leveling. They are available in 6-in. size with lifting capacity of approximately three tons, and 8-in. size with five ton lifting capacity.

Equipment leveling device of the *Filter & Injector Company* is self-locking under load.

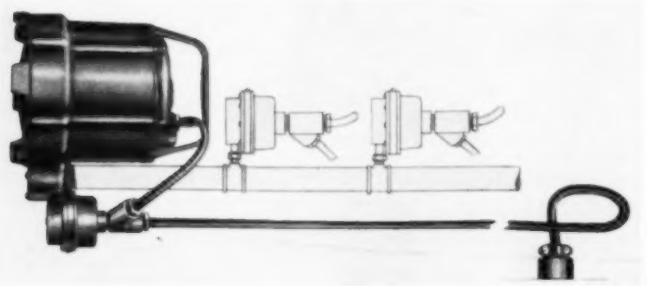
Water Level Control for Sump & Circulating Pumps

J-9 KENCO, INC., 1125 North Ridge Road, Lorain, Ohio, is offering precision, automatic control of the water level at which sump and circulating pumps will turn on, with the company's exclusive switch and submersible pump.

For example, if a sump is small with a constant flow of water entering, the switch can be placed just as high as necessary on the discharge pipe to keep the number of cycles to a minimum. Otherwise, pump operates too frequently. Manufacturers can use this same method for sump pumps or circulating pumps where it is desirable to pump a tank or sump dry after letting it fill to a desired height.

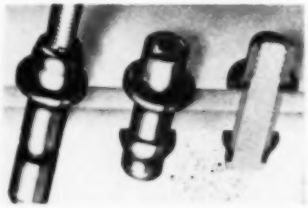
If it is desirable that a certain amount of liquid remain in the tank or sump, the pump can be easily placed on blocks to raise it to the required height. This brings precision automatic control to pump users. Perfect operation on special jobs like these is said to be assured by the exclusive submersible switch which has no exposed electrodes or floats to corrode or stick. Further, the submersible circulating or sump pumps operate at any practical depth and are completely waterproof.

Submersible switch by *Kenco, Inc.* has no exposed electrodes or floats. Pumps available in capacities up to 3300 gph at 10 ft head.



Blind Lockbolt Has Swaged Lock Device

J-10 THE HUCK MANUFACTURING COMPANY, 2480 Bellevue, Detroit 7, Mich., announces the Huck Blind Lockbolt, a heat treated alloy steel blind fastener with a positive swaged lock.



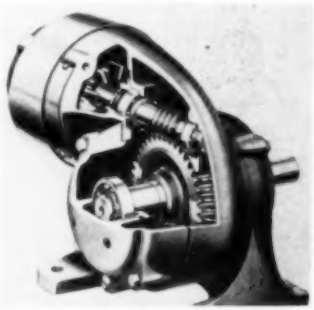
Installational views of the Huck Blind Lockbolt. The ¼ in. diameter size has an ultimate allowable single shear strength of 4990 lb and tensile strength of 1760 lb. The 5/16 in. size has a single shear strength of 8190 lb and tensile strength of 3275 lb.

Applicable to many plant maintenance repair and assembly operations, the device can be applied by one man from one side of the work only. It will pull the sheets together and impart a tensile preload and give shear values of 75,000 psi. Tools used for installations are standard rivet pull guns, operating on 90 lb air pressure.

Right-Angle Worm-Gear Motor

J-11 U. S. ELECTRICAL MOTORS, INC., P. O. Box 2058, Los Angeles 54, Calif., has introduced an entirely new line of low speed right-angle worm-gear motors.

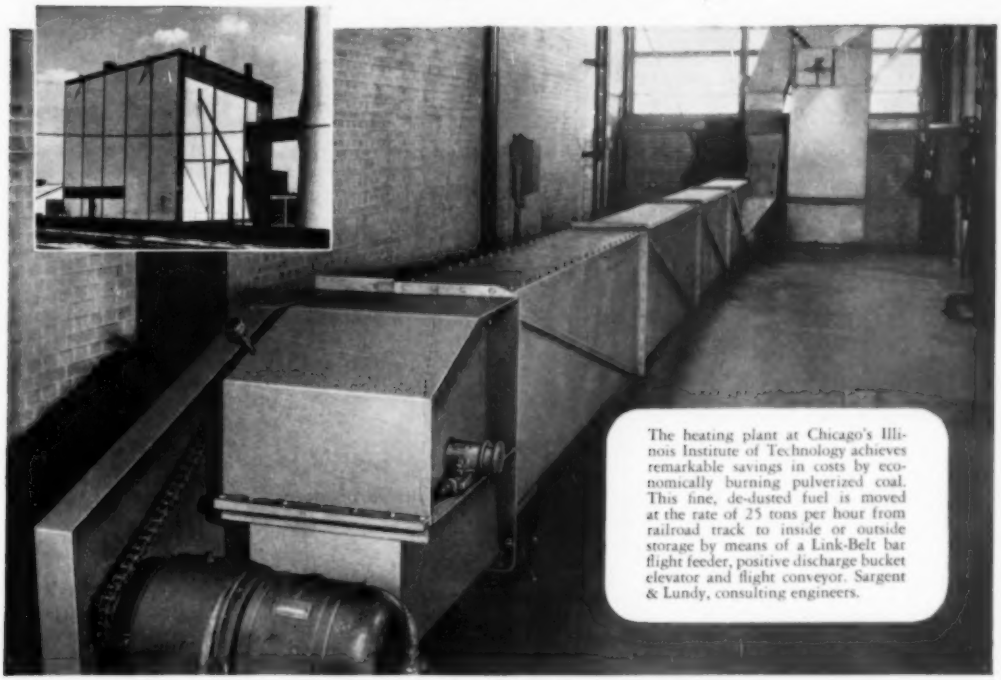
Type GW incorporates a cantilever design to protect gear alignment. Mounting stresses are absorbed by a rugged single unit pyramidal base with "spread eagle" feet. The gear



Low speed, right-angle worm-gear motor of *U. S. Motors* incorporates a cantilever design to protect gear alignment.

For 1 ton or 2000 tons

of coal per hour...



The heating plant at Chicago's Illinois Institute of Technology achieves remarkable savings in costs by economically burning pulverized coal. This fine, de-dusted fuel is moved at the rate of 25 tons per hour from railroad track to inside or outside storage by means of a Link-Belt bar flight feeder, positive discharge bucket elevator and flight conveyor. Sargent & Lundy, consulting engineers.

LINK-BELT equipment cuts handling costs

NO TWO power plants have identical coal handling requirements. That's why Link-Belt is in a unique position to help you get the most efficient system for your special conditions.

Large or small . . . boat, rail or truck-supplied . . . inside or outside storage — Link-Belt engineers can bring a vast store of experience to focus on your particular problems.

Equally important, Link-Belt builds all types and sizes of unloading and handling machinery. You get the *right* equipment for the job, to fit your needs *exactly*.

Link-Belt can take care of every detail of your coal handling system, from planning through erection. For full information, call the Link-Belt office near you.

Link-Belt equipment for power plants...
Railroad car dumpers and shakers; coal displacers; receiving hoppers; dock cranes and unloading stations; silo and ground storage systems; coal crushers; dryers; feeders, conveyors and elevators of every type; weigh larries; complete line of chains and mechanical power transmission machinery.

LINK-BELT
COAL HANDLING EQUIPMENT
LINK-BELT COMPANY: Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Houston 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8, Springs (South Africa), Sydney (Australia). Offices in Principal Cities. 12,778

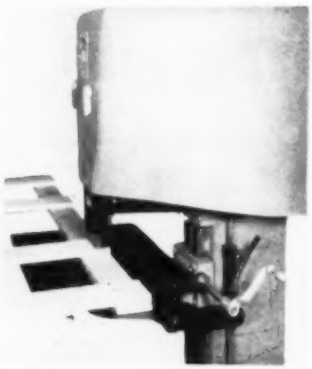
New Book 2410 contains 44 pages of typical power plant handling equipment and layouts. Ask for your free copy.

and motor housing are free from distortion. It embodies splash lubrication, a hardened and ground worm, leakproof oil seal and asbestos-protected windings. It has self-locking brake action. The parabolic contour of the motor housing gives the unit a pleasing appearance. This new motor is built in speed ranges from 20 to 155 rpm and gear ratios up to 58:1. Horsepower ranges from ¼ to 3. It is made in both 3-phase and single phase. It can be installed horizontally or upright and can be provided with a footless flange mounting. Other modifications provide variable speed, splashproof design and total enclosure.

Automatic Nailing Machine for Wood—Metal—Plastic

J-12 THE AUTO-NAILER CO., 267 Marietta St., N.W., Atlanta, Georgia, announces an automatic nailing machine which will handle all types of wood, light metal, and plastic nailing operations.

One foot operation cuts and drives nails from a coil of knurled nailing wire. If the pedal is held down, machine cuts and drives at the rate of three nails per second—clinching, or bradding as it goes and driving either flush or countersunk. Control knob makes the nail the exact length wanted for the job at hand.



The Auto-Nailer Company's automatic nailing machine puts skids together in a hurry. In one plant test the machine did the job in 45 seconds. Hand nailing required just over four minutes. Unit will handle all types of wood, light metal, and plastic nailing operations. Foot-pedal operation cuts and drives nails from a coil of knurled nailing wire.

Push Button Controlled Electric Chain Hoist

J-13 CHISHOLM-MOORE HOIST CORPORATION, Tonawanda, N. Y., announces the addition of a push button control model to their line of Comet Electric Chain Hoists.

New push button controlled electric chain hoist of *Chisholm-Moore Hoist Corporation* available in capacities from 250 to 2,000 lb.

This new model is designed for plug-in operation from any single phase lighting circuit, 220 or 440 volt power line. Regardless of voltage used, no more than 110 volts pass through control station. Sensitive load control speeds up "spotting" in production lines. Other features are double duty flexible welded steel load chain; upper and lower safety limits; helical (spiral) gears; positive chain guide; precision bearings; fully enclosed mechanism; and premanent lubrication.

Elecric Freight Truck with Reversible Shelf

J-14 THE MARKET FORGE COMPANY, Everett, Mass., is now supplying its electric Load-Mobile Freight Trucks with new reversible shelves of sturdy all-steel construction.

Incorporating both a flat and a railed side, the shelves may be used with the flanged side down to handle bulky over-hanging items or the flanged side up to carry smaller parts and parcels without danger of their falling off. More than one shelf may be used at the same time to further increase platform space. The truck is also available with a rim-guard to hold goods in place on the main 14 sq ft freight deck.

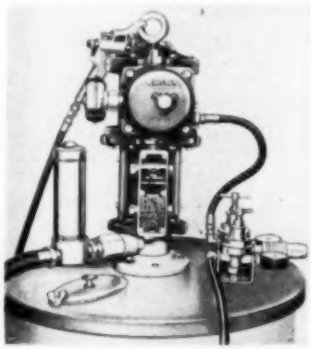
Reversible shelves double the capacity of *Market Forge Company's* freight truck.

Standard ¾ hp series motor gives maximum speeds ranging from 3 to 5 mph, and provides adequate power to climb inclines of 5 degrees to 10 degrees, depending on the load. A new high efficiency 1 hp series motor is now available at low additional cost. Traveling speeds are increased 25-30 per cent giving a maximum no-load performance of close to 6 mph. Both power units are interchangeable with those of the entire 7-model Load-Mobile line.

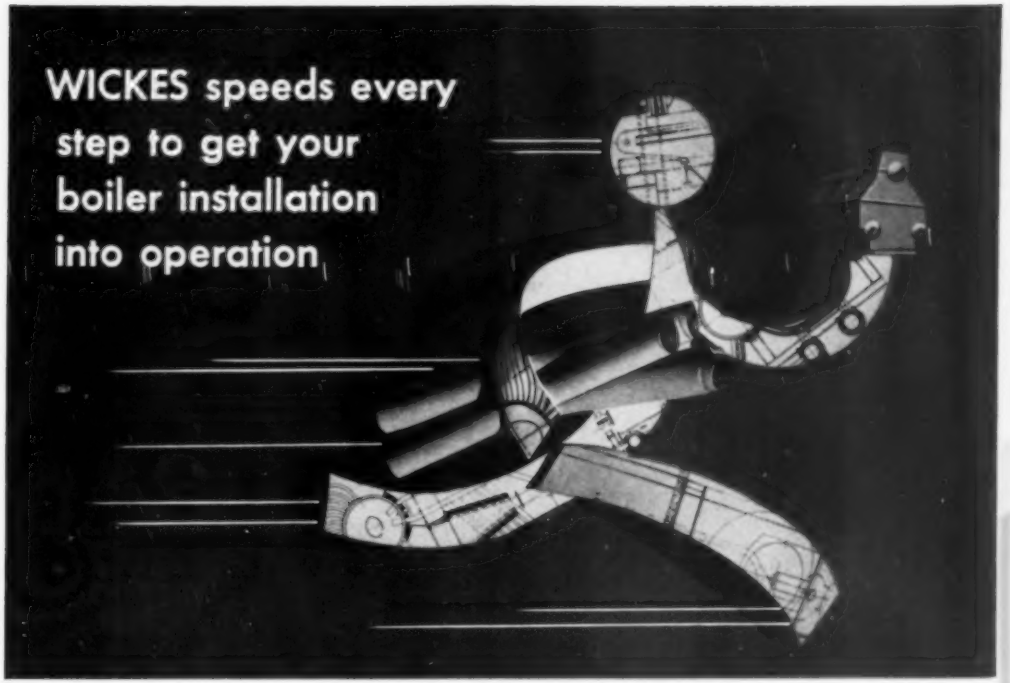
Power-Pumps for Dispensing Materials and Compounds

J-15 LINCOLN ENGINEERING CO., 5702-24 Natural Bridge Ave., St. Louis 20, Mo., has announced a complete line of air-motor operated pumps and accessories for automatic application of heavy to light materials, such as sealers, adhesives, roofing, waterproofing, insulating, and caulking compounds.

Eleven standard models provide complete systems for Spray Gun, Pole Gun and Flo-Gun applications. Models are available for use with original 400 lb and 100 lb drums, and with container for 5 gal material package.

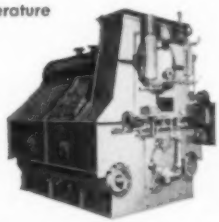


WICKES speeds every step to get your boiler installation into operation



From the moment you place your order for a Wickes boiler, Wickes engineers and production men swing into action. They know that when you want a new steam generator, you want it fast and they rush production to get it to you. Wickes does the whole job, too—from the time the first drawings are made right up to the day you raise steam pressure. They build the boiler and they handle every last detail of installation. Then Wickes service takes over and continues for the life of the boiler. Wickes sales engineers and maintenance men in most principal cities are ready to serve you day or night.

Wickes can fill your requirements for steam generators up to 250,000 lbs. per hour and 1000 psi.—all types of multiple drum boilers adaptable to any standard method of firing. Wickes boilers operate at a high degree of efficiency and owners' records show modest maintenance costs. Write today for descriptive literature or consult your nearest Wickes representative.



WICKES

140

THE WICKES BOILER COMPANY

DIVISION OF THE WICKES CORPORATION, SAGINAW, MICHIGAN

RECOGNIZED QUALITY SINCE 1854 **• SALES OFFICES:** Atlanta • Boston • Buffalo • Chicago • Cincinnati • Cleveland • Denver • Detroit • Greensboro, N. C. • Houston • Indianapolis • Los Angeles • Memphis • Milwaukee • New York City • Pittsburgh • Portland, Ore. • Saginaw • San Francisco • Springfield, Ill. • Tampa, Fla. • Tulsa • Washington, D. C.

NEWS for the South and Southwest

Dow Corning Expands in South-Southwest

MAX LEAVENWORTH, Southwest Branch Manager, DOW CORNING CORPORATION, 2722 Taylor Street, DALLAS, TEXAS, has announced the opening of a new sales office at 4101 San Jacinto St., HOUSTON, TEXAS. TED B. GOLDMANN, formerly of the Dallas office, will serve industrial customers of the rapidly expanding Gulf Coast area. The Houston operation will function as a sales office under the Dallas branch. A similar sales office at 809 Central Building, WICHITA, KANSAS, has been in operation for some time under KEN F. GEROLD.

R. B. EHLERS, Branch Manager, heads up the Southeastern headquarters for Dow Corning at 1343 Spring St., N.W., ATLANTA, GEORGIA. Other industrial sales representatives in the Southeast with headquarters in Atlanta are RICHARD E. KNOPF, ROBERT ROOKS, and SAM WOOTEN.

Dow Corning manufactures silicone water repellents, fluids, release agents, lubricants, defoamers, protective coatings, electrical insulation, Silastic—a silicone rubber, and other silicone products.

Owens-Illinois Appoints Allied Services—W. Va.

ALLIED SERVICES, INC., CHARLESTON, WEST VIRGINIA, have been appointed distributor-applicator for Kaylo Heat Insulation by OWENS-ILLINOIS GLASS COMPANY.

Principals in Allied Services are CONRAD L. WIEGERS, president and general manager; WILLIAM D. PARKS and L. S. PENNINGTON, sales engineers with many years of insulating experience. The company's president has been active in the insulation field for the past 22 years and the company handles a complete line of industrial insulating materials and accessories for hot and cold applications.

New District Sales Office of Chicago Pneumatic is located at 91 16th Street, N.W., Atlanta, Georgia. *R. B. Miller* is District Manager. Atlanta office will serve as District Headquarters for the North Carolina, South Carolina, Eastern Tennessee, Georgia, Florida, Alabama, Mississippi, and Louisiana sales territory.

Chicago Pneumatic Tool Co. Opens Atlanta Sales Office

THE CHICAGO PNEUMATIC TOOL COMPANY announces the completion and official opening of its new District Sales Office at 91 16th Street, N.W., Atlanta, Georgia. MR. R. B. MILLER is District Sales Manager.

The new office serves as District Headquarters for the NORTH CAROLINA, SOUTH CAROLINA, EASTERN TENNESSEE, GEORGIA, FLORIDA, ALABAMA, MISSISSIPPI, LOUISIANA sales territory. Additional company representatives are working out of the BIRMINGHAM and NEW ORLEANS areas.

The air-conditioned offices, complete service station and warehouse occupy 4000 square feet. Truck pick-ups, and deliveries are expedited by a loading dock at the side of the building. Because of these improved storage and equipment handling facilities, it will be possible to stock portable and small stationary air compressors, and maintain a complete inventory of pneumatic and electric power tools.

FUTURE EVENTS Of Engineering Interest

PAN-AMERICAN UNION OF ENGINEERING SOCIETIES, Engineers Joint Council, 29 West 39th St., New York 18, N. Y.
Aug. 25-30, Third UPADI Congress, Tulane University, New Orleans, La.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS, C. E. Davies, Sec'y, 29 West 39th St., New York 18, N. Y.
Sept. 8-11, Fall Meeting, Sheraton Hotel, Chicago, Ill.
Sept. 8-12, Industrial Instruments & Regulators Divison and Instrument Society of America Exhibit & Joint Conference, Auditorium, Cleveland, Ohio
Sept. 22-24, Petroleum Mechanical Engineering Conference, Hotel President, Kansas City, Mo.
Oct. 30-31, Fuels and AIME Coal Divisions Joint Conference, Bellevue-Stratford Hotel, Philadelphia, Pa.
Nov. 30-Dec. 5, Annual Meeting, Statler Hotel, New York, N. Y.

AIR POLLUTION & SMOKE PREVENTION ASSOCIATION OF AMERICA, R. W. Bourne, Ch. Engr., Louisville Air Pollution Control Commission, 304 City Hall, Louisville, Ky.
Sept. 18-19, East Central Section Meeting, Kentucky Hotel, Louisville, Ky.

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS, H. H. Henline, Sec'y, 33 West 39th St., New York 18, N. Y.
Oct. 13-17, Fall General Meeting, New Orleans, La.

NATURAL GASOLINE ASSOCIATION OF AMERICA, Wm. F. Lowe, Sec'y, 422 Kennedy Bldg., Tulsa 3, Okla.
Oct 19, Southern Regional Meeting, The Blackstone Hotel, Tyler, Texas

NATIONAL ASSOCIATION OF PURCHASING AGENTS, George R. Renard, Exec. Sec'y, 11 Park Place, New York 7, N. Y.
Oct. 19-21, 7th District, 9th Annual Conference of Purchasing Agents of the Southeast, J. R. Carmichael, Conference Program Chmn., Atlanta, Ga.

AMERICAN SOCIETY FOR METALS, W. H. Eisenman, Sec'y, 7301 Euclid Ave., Cleveland 3, Ohio
Oct. 20-24, National Metal Congress & Exposition, Philadelphia Convention Hall, Philadelphia, Pa.

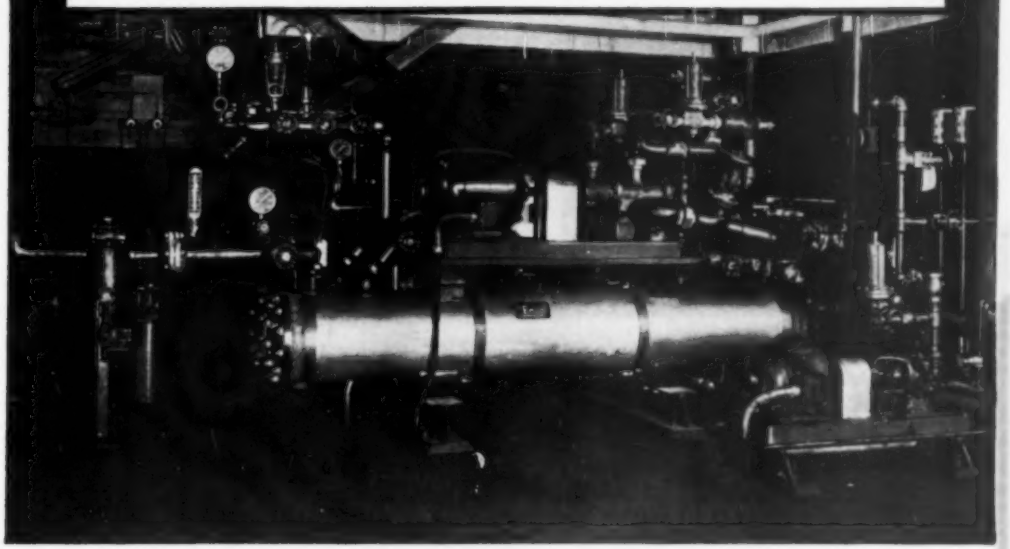
EDISON ELECTRIC INSTITUTE, H. S. Hennion, Mgng. Dir., 420 Lexington Ave., New York 17, N. Y.
Oct. 23-24, Transmission & Distribution Committee, Hotel Adolphus, Dallas, Texas

SOUTHERN ASSOCIATION OF SCIENCE & INDUSTRY, H. M. Conway, Jr., Dir., 5009 Peachtree Road, Atlanta, Ga.
Oct. 23-24, Southwide Chemical Conference, Auburn, Ala.

AMERICAN GAS ASSOCIATION, H. Carl Wolff, Mgng. Dir., 420 Lexington Ave., New York 17, N. Y.
Oct. 27-Nov. 1, Annual Convention, Auditorium, Atlantic City, N. J.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS, Charles F. Roth, Mgr., Publicity Dept., 20th National Power Show, Grand Central Palace, New York 17, N. Y.
Dec. 1-6, Twentieth National Exposition of Power & Mechanical Engineering, Grand Central Palace, New York, N. Y.

2 separate ENCO Fuel Oil Units Meet Plant Needs



Here is a typical Enco two-unit installation which handles fuel oil pumping and heating requirements in the plant of a building materials manufacturer.

Fuel Oil Pumping and Heating Unit, built with two pumps and two heaters, is designed for continuous plant load service. Capacity is 11 gpm Bunker C fuel oil with one pump or one heater at 300 psig pressure with a temperature rise from 90F to 230F.

Light Oil Pumping Unit for cold start-up service. Capacity is 3 gpm #2 oil at 300 psig pressure.

Enco pump sets are designed to give you easier control and longer maintenance-free operation. They are simple and economical to install. All you need do is to connect to station piping and run. Before shipping, every Enco Fuel Oil Pumping and Heating Unit is completely tested under high pressures. For complete details on wide-range line, write for Bulletin O B-37.

Only ENCO offers all ten plus features

1. Completely Automatic Operation is assured by automatic temperature and pressure regulation valves.

2. Coordinated Design Saves Space. All equipment essential to the preparation of fuel oil for combustion is contained in one compact unit.

3. Individually Designed to meet the specific needs of the particular power plant in accordance with its exact operating requirements.

4. All Parts Visible and Accessible for easy operation, maintenance and repair.

5. Pumps and Heaters are interconnected to provide maximum flexibility of operation.

6. Safety Valves protect individual parts where required.

7. Easier Maintenance — Less Service-Time for Cleaning because straight tube, multi-pass heaters with removable heads are used.

8. Pumps Operate at Moderate Speed. Heaters designed to give the correct viscosity and velocity without fouling.

9. Smoother Flow of Clean Fuel to Furnace. Air chamber for each piston pump prevents pulsations—pressure regulator for rotary pumps. Twin type strainers provided to keep atomizer tips from clogging.

10. Cleaner Boiler Room . . . all overflows connected to a common outlet, flanged drip pan catches oil drip.

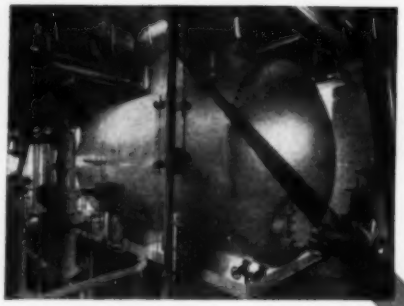
EC 488

THE ENGINEER COMPANY

75 WEST STREET, NEW YORK 6, N. Y.

BELCO Deaerators and exclusive Belco Atomizing Valves insure best results

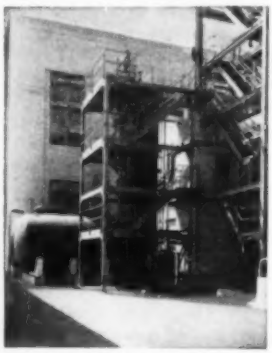
PROCESSES FOR REMOVAL OF WATER IMPURITIES



Capacity: 300,000 lbs. per hour

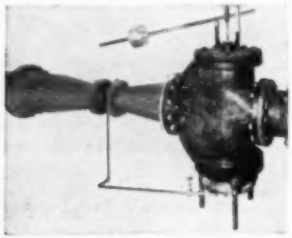
The fine spray produced with the Belco valve makes heating practically instantaneous when sprayed into an atmosphere of steam. Because of the quick primary heating, steps of separation of the gases and/or chemical action are more rapid. The second step scrubber section of the Deaerator insures ebullition and absolute removal of all corrosive gases. The oxygen content of the effluent from a Belco Deaerator is less than 0.005 ml. per liter.

IT WILL PAY YOU TO CHOOSE YOUR DEAERATOR CAREFULLY!



BELCO HOT PROCESS SOFTENER

Belco builds units to fit your requirements—large or small. Call us next time you consider equipment. We're sure we can help to your advantage.



BELCO RATE OF FLOW CONTROLLER

★ We invite your consultation regarding all water conditioning requirements. Get acquainted with our organization for authoritative assistance and close cooperation. Write for descriptive bulletins.

Belco

Belco Industrial Equipment Division, Inc.

PATERSON 3, NEW JERSEY

news (continued)

ASME Nominates Blackall

Paul R. Yopp and Harry Pearson Named Regional Vice-Presidents

The nomination of FREDERICK S. BLACKALL, JR., president and treasurer of the Taft-Pierce Manufacturing Co., Woonsocket, R. I., as 1953 president of THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS, was announced recently by the society. Mr. Blackall heads a slate of new ASME nominees, including four regional vice presidents and two directors-at-large. Since only one name is presented for each office, nomination is tantamount to election.

Paul R. Yopp, District Sales Manager, the Babcock & Wilcox Co., Atlanta, Georgia

Election will take place in the Fall by letter ballot of the membership of over 35,000 engineers. New officers will begin their terms at the conclusion of the ASME annual meeting next December. Mr. Blackall will succeed REGINALD J. S. PIGOTT.

Included in the nominations for regional vice presidents are PAUL R. YOPP, district sales manager, The Babcock & Wilcox Co., ATLANTA, GEORGIA; and HARRY R. PEARSON, personnel director, Dallas Power & Light Co., DALLAS, TEXAS.

Mr. Blackall entered the employ of

Harry Pearson, Personnel Director, Dallas Power & Light Co., Dallas, Texas.

Taft-Peirce Manufacturing Co., makers of machinery and tools, in 1922. He became vice president and general manager in 1929 and has been president and treasurer since 1933. He is a Fellow of the ASME and a member of the American Society for Metals, American Society of Tool Engineers, and other engineering organizations.

Mr. Blackall is a director of the Federal Reserve Bank of Boston; a director and member of the executive committee of the New York, New Haven & Hartford Railroad Co.; president of the Woonsocket Hospital; and is active in various other financial, industrial, and technical organizations.

Copes-Vulcan Division Formed

COPES-VULCAN DIVISION, CONTINENTAL FOUNDRY & MACHINE COMPANY, has been formed by a consolidation of NORTHERN EQUIPMENT DIVISION of Erie, Pa., and VULCAN SOOT BLOWER DIVISION of DuBois, Pa.

General offices and factory of Copes-Vulcan Division are at 939 West 26th St., Erie, Pa., where all activities of the two formerly independent divisions have been moved.

Principal products include Copes boiler feedwater regulators, desuperheaters, pressure reducing valves and other boiler controls as made and sold for many years by Northern Equipment, and Vulcan soot blowers of all types for the mechanical cleaning of boilers.

With the new plant providing almost twice the total space used by the two former divisions in their old locations, there has been a substantial expansion and modernization of facilities for engineering, research and manufacturing. There are also completely new and enlarged executive, administrative and sales offices.

George L. Davis is president of Copes-Vulcan Division, with Edwin W. Nick chairman of the board. William L. Hunter is vice president and general manager.

D. E. Hibner, Jr., is vice president, sales, and consulting engineer. W. J. McDonough is general sales manager and Don Allshouse advertising manager.

The engineering staff includes V. V. Veenschoten, vice president, F. W. Bunting, chief engineer, and Joseph Kissick, III, assistant chief engineer. H. H. Weining is director of research and development.

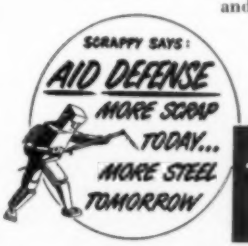
Clyde E. Smith is vice president, manufacturing. Don L. Lowery is plant superintendent. Plant Engineer is Harold A. Flaugh.

Manufacturers, fabricators, and users of steel products are all finding hot-dip galvanizing the answer to many common problems.

Manufacturers and fabricators are using our facilities to improve their products—give them greater sales appeal, longer-lasting qualities.

Users of steel products know from long experience that hot-dip galvanizing *alone* gives positive protection against rust and corrosion—adds years of life.

Find out how little this superior service costs. Send us complete details of materials, including full dimensions, and we'll gladly give you a quotation.



Single-dip size—Larger sizes by double-dipping.

Atlantic Steel Company

MAKERS OF DIXISTEEL SINCE 1901

ATLANTA, GEORGIA • EMERSON 3441

Carriers roll off power conveyor in finishing oven to crosstrack switches for 90° transfer to shipping area.

Carriers descend through degreasing tank on power-operated chain conveyor

Solenoid operated switch automatically brings trolleys on parallel tracks into single track alignment.

A well-known metal partition manufacturer faced the problem of increasing production without enlarging building. New and better handling methods were obviously needed. They chose an American MonoRail overhead handling system as the best answer to increase capacity without increasing space and **with less handling labor.** Now, this American MonoRail system handles the steel components from receipt of raw materials, through finishing to shipping. The system boosted production, cut handling labor, improved space utilization, reduced material damage, bettered working conditions, and improved production control.

Let an American MonoRail engineer show you how it can be done in your plant.

THE AMERICAN MONORAIL COMPANY

13105 ATHENS AVENUE • CLEVELAND 7, OHIO

news (continued)

Texas Gas Appoints Horstman

H. G. HORSTMAN has been appointed Assistant to the President of TEXAS GAS TRANSMISSION CORPORATION, it was announced recently.

Mr. Horstman has been with the company since May, 1950, as Director of Sales and Customer Relations. His experience in the utility field covers a period of more than thirty years. Prior to joining Texas Gas he was with the Public Service Company of Indiana.

Distinguished Service Award for Otis Rae—Westinghouse

OTIS RAE, Southeastern District Manager of Westinghouse Electric Corporation in Atlanta, Georgia, was one of nine executives and engineers of the company to receive the Westinghouse Order of Merit at the recent presentation in New York City. It is the highest Company award for distinguished service.

Otis Rae, Westinghouse Electric Corporation's Southeastern District Manager, with headquarters in Atlanta, Georgia

His citation read "For his resourcefulness in promoting the sale of Westinghouse apparatus in the Southeastern District; for his appreciation of his customers' problems and his untiring energy in serving their needs; and for his leadership in civic and community affairs in the important area he serves."

A native of Augusta, Georgia, MR. RAE was graduated from Georgia Institute of Technology in 1918 with a bachelor of science degree in electrical engineering. He served with the Army Engineers before joining the Westinghouse graduate student

course at East Pittsburgh, Pa., in 1919. Two years later he was transferred to the Atlanta office, and was appointed electric utilities manager there in 1934. He was promoted to his present post in 1950.

Chemstrand—Alabama

CHARLES D. LANE and SAMUEL A. MOSLEY, chemists in the research and development department of THE CHEMSTRAND CORPORATION, have been transferred to DECATUR, ALABAMA, from Dayton, Ohio, DR. FRANK J. SODAY, director, announced.

Both men previously were engaged in research and experimentation at Chemstrand's laboratories at Dayton. Mr. Lane joined Chemstrand in June, 1951, and Mr. Mosley in September, 1951.

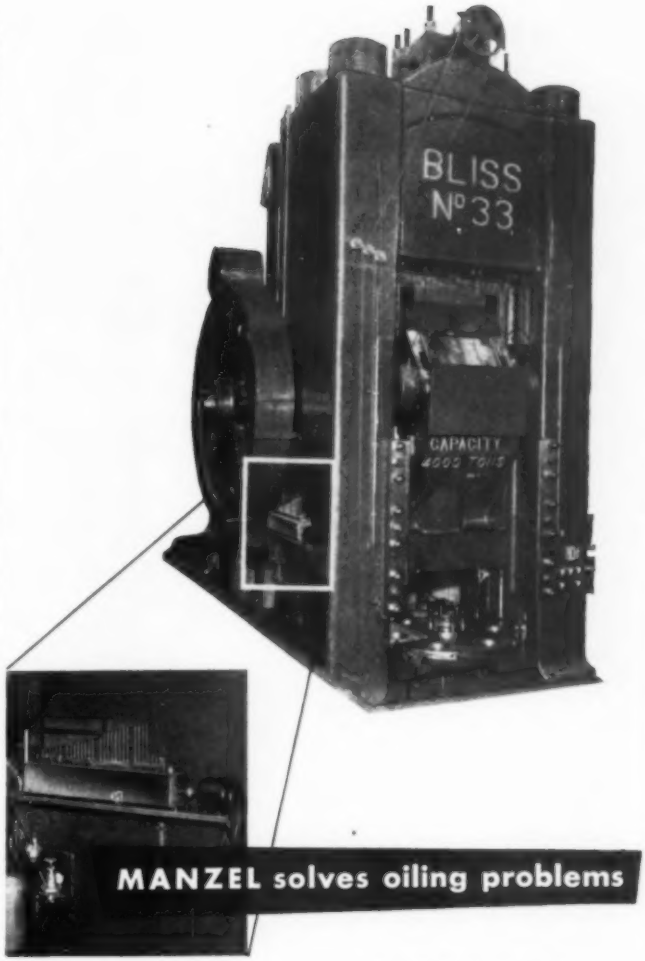
Chemstrand is building its company headquarters, research center and Acrilan acrylic textile fiber plant at Decatur, and nylon filament yarn plant near PENSACOLA, FLORIDA. Fabrics and garments of Acrilan are scheduled for the retail market in September.

Spencer Chemical Co. Orders Vicksburg Plant Equipment

Contracts have been executed for the design and manufacture of heavy equipment for the production of anhydrous ammonia in the $15,000,000 plant of SPENCER CHEMICAL COMPANY now under construction at VICKSBURG, MISS. The plant will make 200 tons of ammonia daily for use as fertilizer.

Machinery to be built at a cost of more than $1,000,000 will extract from the air 180 tons of oxygen of 98 per cent purity and 310 tons of nitrogen of nearly 100 per cent purity per day. This installation will be a larger modification of Air Products equipment in use by steel producers and fabricators, and represents the first large-tonnage application of such a system in the chemicals industry. The plant will be the first to produce anhydrous ammonia by the partial oxidation of natural gas from oxygen.

With the new generator, Spencer will be able to produce ammonia at a cost at least six per cent less than that of alternative processes because the generator can provide oxygen at the required pressures more economically. Also, location of the plant at Vicksburg means that the process can take advantage of the pressure at which natural gas is available there from pipelines. The plant is scheduled to start production in June, 1953.



MANZEL solves oiling problems

Manzel lubricates Bliss Press. What's your problem?

Insure many years of economical, trouble-free service from all types of machinery with *Manzel* Force Feed Lubrication. Adaptable to numerous difficult oiling problems, "Manzel's" can be engineered to *your* requirements. Experienced representatives throughout the country.

Just write . . .

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318 Babcock Street Buffalo 10, N. Y.

Deming "MOTOR-MOUNT" Condensation Return Units (above and at right). Single and Duplex units for 2,000 to 40,000 sq. ft. of radiation.

Deming Fig. 4958 Centrifugal Jet Units (below) for 500 to 10,000 sq. ft. of radiation.

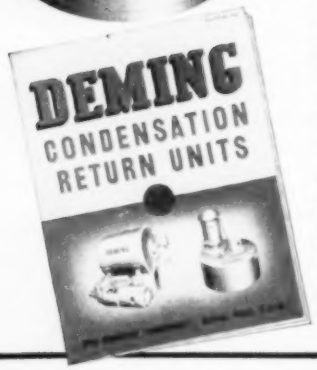
● These modern, efficient "fuel-savers" return the condensate from steam coils, radiators, or steam operated equipment back to the boiler.

Deming "Motor-Mount" centrifugal pumps are used on Deming "Motor-Mount" Condensation Return Units. Pump motors have standard "NEMA" type "C" mounting flange and are furnished for single phase, two or three phase or for direct current, as specified.

"Motor-Mount" pumps are equipped with enclosed type bronze impeller and stainless steel pump shaft. Deep stuffing box is provided with conventional packing rings for grease lubrication.

Deming Fig. 4958 "Hotshot" Condensation Return Units are equipped with a centrifugal jet pump. Entire pumping unit and jet can be removed for cleaning without disturbing any of the piping.

Ask your Deming Distributor or write us for illustrated Bulletin No. 4400 which includes performance tables to simplify selection of proper unit to meet specific requirements.



THE DEMING COMPANY
549 Broadway • Salem, Ohio

news (continued)

Air Pollution & Smoke Prevention Ass'n Meets

The East Central Section of the AIR POLLUTION AND SMOKE PREVENTION ASSOCIATION OF AMERICA will meet in LOUISVILLE, KENTUCKY, Sept. 18-19, 1952.

Included in the program will be a paper, "The Use of Radioactive Tracers in Air Pollution Study," to be presented by EDWARD G. STRUXNESS of the Health Physics Division, Atomic Energy Commission at OAK RIDGE, TENN. H. B. LAMMERS, Chairman of the Coal Producers' Committee for Smoke Abatement, will present a paper on "Past and Future Plans of the Fuel Industry in the Control of Air Pollution." A paper covering the past twenty-five years in steam locomotives through diesel and a projection into the future prime movers such as steam and gas turbine, "Trends of Railroad Motive Power and Its Effect on Air Pollution," will be presented by C. N. WIGGINS, C. LOVE, and MR. JOHNSON of the LOUISVILLE AND NASHVILLE RAILROAD Engineering Department.

Anyone interested in attending the meeting may contact R. W. Bourne, Chief Engineer, or J. C. Marks, Asst. Chief Engineer, Louisville Air Pollution Control Commission, Room 304, City Hall, Louisville, Kentucky.

Kewanee-Ross Merger

Kewanee Boiler Corporation and Ross Heater & Manufacturing Co., Inc., two divisions of AMERICAN RADIATOR & STANDARD SANITARY CORPORATION, have combined to form a new company, KEWANEE-ROSS CORPORATION.

Kewanee has long been known as a manufacturer of steel heating and power boilers, with main offices and works at Kewanee, Ill., and an eastern plant at Lebanon, Pa.

Ross, a manufacturer of shell and tube heat exchangers, surface condensers and allied equipment, has its executive offices and plant in Buffalo, N. Y.

Both units of Kewanee-Ross Corporation will continue to operate as before, maintaining their respective plant locations, sales offices and representatives. CHARLES H. CURRIER, formerly president of Ross Heater & Manufacturing Co., Inc., has been named chairman of the board of di-

rectors of Kewanee-Ross Corporation. W. BRADFORD RUSSELL, formerly president of Kewanee Boiler Corporation, is president of the new firm.

Texas Eastern—Houston

TEXAS EASTERN PRODUCTION CORPORATION, HOUSTON, TEXAS, has announced the appointment of ROBERT E. DANIEL, secretary and treasurer; JAMES W. BURKHART, production manager; and HADEN J. UPCHURCH, manager, land department.

Conoflow Corp.—St. Louis

CONOFLOW CORPORATION, Philadelphia manufacturers of pneumatic control equipment, has appointed BRUCE GREAVES CO. to represent Cono Controls.

Located in St. Louis, the Bruce Greaves Co. will service the eastern part of Missouri.

P. O. E. Johnson

February 17, 1892 — July 2, 1952

Peter Oscar Edwin Johnson, known to his friends as "Pete," Western Business Manager of SOUTHERN POWER & INDUSTRY and SOUTHERN HARDWARE, died of a heart attack at his Highland Park, Illinois, residence on July 2.

P. O. E. Johnson

Born in Chicago, February 17, 1892, Mr. Johnson received a B.S. degree in Mechanical Engineering from Armour Institute. He was Captain in the first World War, seeing extensive overseas duty. Upon returning to civilian life, he was associated with the Worthington Corporation as sales representative, later with Pure Oil Company as manager of barge operations, McGraw-Hill Publishing Company as business representative and Hearst Publications, joining the W. R. C. Smith Publishing Company, May 1, 1940.

During the ensuing years he gave his utmost to the building of appreciation of the Industrial South.

In his passing, we have lost an able and conscientious associate and a true friend.

W. J. Rooke, President.
W. R. C. Smith Publishing Company

for 50 to 1 reduction on

OZALID STREAMLINER

developer drives . . .

WINSMITH SPEED REDUCERS ®

A copy in less than 30 seconds! Printing speed up to 14 ft. per minute! That's what this Ozalid Streamliner turns out for thousands of engineering, purchasing, personnel and accounting departments across the nation.

Because reproduction of letters, reports, drawings and records usually "can't wait", every component of Ozalid copying machines must be constantly relied upon to do its bit without failure. The Winsmith single reduction, 50:1 ratio, right angle drive, worm gear type reducer is a good example.

Serving the blower, developer and pump drive, which is powered by a 1/3 hp motor, this small, compact Winsmith unit is designed for the long-lasting service which Ozalid requires of all its components. Moreover, its vibrationless operation is necessary to the smooth, quiet performance for which the Streamliner is so well known. "We are pleased with the little servicing that these units have demanded over countless hours of usage", says Ozalid's chief engineer.

The importance that Ozalid, Division of General Aniline and Film Corporation, places on the selection of a speed reducer is typical of most industries . . . the very reason so many have become Winsmith users. Within the 1/100 to 85 hp range, no other speed reducer is available in so complete a selection of standardized types, sizes and ratings. *Catalog 148 will convince you.* Write!

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EMERSON FANS • MOTORS — Emerson Electric — **ELECTRIC** APPLIANCES

news (continued)

Reynolds Metals, New Orleans

The appointment of FRED R. HAEUSER, JR., as Regional Representative Industrial Sales for the NEW ORLEANS office was recently announced by REYNOLDS METALS COMPANY, LOUISVILLE, KENTUCKY.

Fred R. Haeuser, Jr., now regional representative in New Orleans for *Reynolds Metals Co.*

Mr. Haeuser is a native of New Orleans. He attended Tulane University and Louisiana State University at Baton Rouge, receiving a B.S. in Mechanical Engineering. Before joining Reynolds Metals in December, 1951, he was with Ford Motor Company at Dearborn, Michigan, and was Industrial Equipment Salesman for William F. Surgi Equipment Corp., New Orleans.

Westinghouse Sturtevant Div.—Atlanta, St. Louis

WESTINGHOUSE ELECTRIC CORPORATION'S STURTEVANT DIVISION has expanded its air handling department by creating eight new regions.

W. J. OONK has been appointed manager of the Southwestern region with offices in ST. LOUIS. D. M. HUTCHINSON has been appointed manager of the Southeastern region with offices in ATLANTA.

Mr. Oonk is a graduate of the University of Missouri and joined Westinghouse in 1929. Prior to that time he was associated with the Union Electric Company in St. Louis. He is a member of the American Society of Mechanical Engineers.

Mr. Hutchinson joined Westinghouse in 1939 subsequent to his graduation from Clemson College, Clemson, S. C. He left the Company in 1948 to join Springs Cotton Mills, returning last year.

Universal Atlas Cement Co. Promotes Dickens of Waco

CHARLES H. DICKENS, assistant plant manager at the WACO, TEXAS, plant of UNIVERSAL ATLAS CEMENT COMPANY, a UNITED STATES STEEL CORPORATION subsidiary, has been appointed general chemist in the New York office.

Mr. Dickens has been assistant plant manager at the Waco plant since 1948 and prior to that was chief chemist there for nineteen years. He joined the cement company in 1922 at its Independence, Kansas, plant, serving there as laboratory assistant and assistant chemist until April, 1929, when he was transferred to the Texas plant as chief chemist.

G. E. Names Lawton

DAVID B. LAWTON, former assistant manager of manufacturing of the GENERAL ELECTRIC COMPANY'S transformer operations, has been named manager of the company's newly-planned transformer manufacturing plant at ROME, GA. Announcement that the company will build at Rome the new multimillion dollar plant, providing employment for about 1,700 persons, was made in May.

David B. Lawton, has been named manager of General Electric Company's newly - planned transformer manufacturing plant at Rome, Georgia.

Mr. Lawton joined the General Electric Company at the Schenectady Works in 1929.

He was appointed general foreman at the company's Fort Edward Plant in February, 1942, and subsequently served as assistant superintendent, plant superintendent and plant manager. He went to Pittsfield in November, 1947, as superintendent of the former Distribution Transformer Manufacturing Division and later was appointed assistant manager of manufacturing.

YOU CAN'T BUY A BETTER COAL SCALE THAN A RICHARDSON

..AND HERE'S ANOTHER REASON WHY..

INLET OPENING, 20" x 20"

This 400-square-inch opening, *exclusive with Richardson,* ensures positive coal flow and never a "hang-up"—even with wet coal. An even greater area at the conveyor belt, due to the angle of repose of the coal providing pressure relief, is a double guarantee of free flow. It is designed to guarantee the ultimate in dependable, on-the-job operation.

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8553

INCO—Huntington, W. Va.

E. M. KLINE has been made General Manager of the HUNTINGTON (WEST VIRGINIA) WORKS of THE INTERNATIONAL NICKEL COMPANY, INC. Mr. Kline succeeds Herman M. Brown, who has retired as General Manager, but whose services hereafter will be available to the company on a consulting basis.

G. K. CROSBY has been appointed Assistant General Manager of the Works succeeding Mr. Kline in that position.

In 1923 Mr. Kline joined International Nickel at the Huntington Works as Assistant Chief Chemist, and subsequently was appointed Chief Chemist and Works Technical Director. Since 1947, Mr. Kline has been Assistant General Manager of the Huntington Works.

Joining International Nickel at its Huntington Works in 1936 as a metallurgist, Mr. Crosby successively became Combustion Engineer; Assistant to the General Manager; Superintendent of Production, and, in 1947, General Superintendent.

National Power Show

The TWENTIETH NATIONAL EXPOSITION OF POWER AND MECHANICAL ENGINEERING will be held in Grand Central Palace, New York, December 1 to 6, 1952. It will be held again under the auspices of the AMERICAN SOCIETY OF MECHANICAL ENGINEERS, whose annual meeting will be in session during the same week.

As heretofore, the biennial event will include exhibits representing every kind of equipment used in the generation and distribution of power, with specific applications in many new ways.

Management of the Power Show continues under the International Exposition Company, with permanent headquarters in the Palace. Charles F. Roth is manager of the exposition. E. K. Stevens is associate manager.

Crane Branch Managers

CRANE CO. has announced the appointment of six branch managers, including K. D. ACKAD, WASHINGTON; CLYDE O. PRICKETT, PHILADELPHIA; MANUEL F. DU CHATEAU, NEW ORLEANS; ALONZO H. SPRINKLE, GREENSBORO, N. C.; ARTHUR S. HEATH, ROCKY MOUNT, and FRANK E. HART, GREAT FALLS, MONT.

Two new assistant managers also were named: FRANCIS S. MCKEE at SIOUX FALLS and LEO A. DONINI at RICHMOND.

Ackad, former manager of Crane's government department, succeeds the late C. P. L. Moran who died after 45 years of service with the company.

Prickett succeeds Jay H. Geiss, at Philadelphia, who is retiring. Prickett, manager at New Orleans since 1948, started with Crane Co. at its Houston, Texas, branch. He was named manager of the firm's Beaumont, Texas, branch in 1931.

Du Chateau goes to his New Orleans assignment from the managership of the Greensboro, N. C., branch. Greensboro's new manager, Alonzo H. Sprinkle, joined Crane at Norfolk in 1942. He was transferred to Roanoke in 1948 and later was appointed assistant manager at Richmond. Heath, formerly a salesman at Norfolk, began his Crane career in 1946. Donini, former manager at Rocky Mount, joined Crane at Richmond in 1926.

RODA — High grade gas, by-product, steam and household stoker coal from Wise County, Virginia, on the Interstate Railroad.

DENDRON — High grade gas, by-product, steam and domestic coal from Wise County, Va., on the Interstate Railroad.

STONEGA — High grade, high volatile steam and by-product coal from Wise County, Va., on the Interstate Railroad.

GLENBROOK — The Premium Kentucky High Splint unmatched for domestic use. Produced in Harlan County, Kentucky, on the L. & N. Railroad.

COKE — Roda and Stonega from Wise County, Va.

CRITERION COAL — High grade gas, by-product, steam and domestic coal—Pittsburgh seam from Irwin Basin, Westmoreland County, Pennsylvania, on the Penna. Railroad.

HAMPTON COAL — High volatile domestic, steam and by-product coal from Boone and Logan Counties, W. Va., on the Chesapeake & Ohio Ry.

CROZER — Genuine Pocahontas from McDowell County, W. Va., on the Norfolk & Western Railway.

LYNCO — High fusion coking coal for by-product, industrial stoker and pulverizer use from Wyoming Co., W. Va., on the Virginian Ry.

ANTHRACITE

Hazel Brook—*Premium Lehigh*
Raven Run—*Premium Mahanoy*
Cross Creek—*First Grade Lehigh*

Our engineering service, available upon application, and long and varied experience is your assurance of the Right Coal — Properly Applied.

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NEW YORK NORFOLK PITTSBURGH

Chicago Pneumatic Tool Co. Starts New Fort Worth Plant

Ground breaking ceremonies for a new plant that will manufacture oil well drilling equipment for the petroleum industry were held recently at FORT WORTH, TEXAS, by the CHICAGO PNEUMATIC TOOL COMPANY.

The plant will contain approximately 130,000 sq ft of floor space. The cost to construct and equip the plant is estimated at $4,500,000. WALTER KIDDE CONSTRUCTORS, engineers and builders of New York and HOUSTON, are in charge of the design and construction program.

Facilities will be provided for machining, grinding, heat treating and hard facing oil well drilling bits. A complete line of three-cone bits, drill collars, tool joints, reaming bits and reamers, rotary subs and junk baskets will be manufactured. The plant is scheduled for completion in the first quarter of 1953, and it is estimated that 500 employees will be required when full production is attained.

The building will include a plant cafeteria and medical facilities for employees. Walls will be constructed of brick, and corrugated asbestos and concrete block in manufacturing areas. The floor in the manufacturing area will be covered with wood block.

Quaker Rubber Corp.—Dallas

QUAKER RUBBER CORPORATION, DIVISION OF H. K. PORTER COMPANY, INC., Philadelphia, has opened a new stock-carrying branch warehouse and sales office at 1327 Levee Street, DALLAS, TEXAS.

The branch will stock the complete line of Quaker's rubber conveyor and transmission belting, hose, packing and moulded rubber products.

The new warehouse has 5,000 square feet of floor space, truck facilities and rail trackage. Mr. D. C. HAHN has been named District Manager and is in charge of the office.

New General Electric Switchgear Development Laboratory

Short circuits of 5,250,000 kva—the most powerful ever produced in a research facility — are created for power-equipment tests in the GENERAL ELECTRIC COMPANY'S new Switchgear Development Laboratory recently opened in Philadelphia, Pa.

These power surges are used in developing, designing and testing circuit breakers and other power equipment used in utility and industrial power systems.

Two generators, designed especially for testing and the largest ever built for short-circuit testing, combine to provide the necessary power. When operated in parallel, the two units can deliver 5,250,000 kva asymmetrical or 3,200,000 kva symmetrical at 15.5 kv, 3 phase.

Robert F. Tinnerholm, General Manager of the G-E Switchgear Department, described the new laboratory as "a high-power fact-finder."

It will play an important role in developing circuit breakers and other equipment equal to the task of harnessing the enormously greater power flow predicted for the future.

The new laboratory, the third such facility built by the company, replaces the switchgear-testing laboratory erected in 1928 at the company's Schenectady works. Since 1921, when the first G-E switchgear test laboratory was erected there, the company has conducted more than 300,000 short-circuit tests of circuit breakers and allied equipment.

BLAW-KNOX STEEL GRATING
in the Front Rank of Industry
ON ALL 5 COUNTS
OPEN SPACE • STRENGTH
LONG LIFE • CLEANNESS
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Blaw-Knox Steel Grating is electroforged into rigid, one-piece panels, using twisted cross bars for firm footing. Bring your open steel flooring problems to Blaw-Knox for expert help. Bulletin 2365 sent on request.
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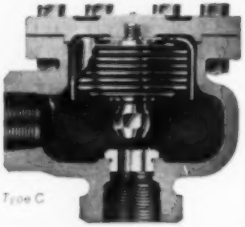
BLAW-KNOX Electroforged® STEEL GRATING

Nicholson Steam Traps

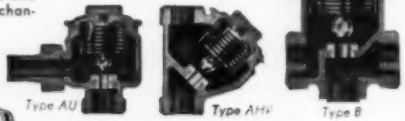
CUT KETTLE TIME 30%

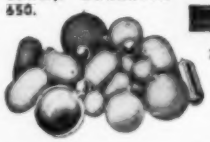
for Leading Processor


Type C

Records of a recent installation of Nicholson steam traps, by a large processor, show they cut kettle time 30%. For example, one operation was shortened from 65 to 45 minutes. Nicholson units keep equipment full of live steam because: 1) they operate on lowest temperature differential; 2) have 2 to 6 times average drainage capacity; 3) maximum air-venting capacity. See why leading plants are increasingly standardizing on Nicholsons.

HIGH-PRESSURE FLOATS—Stainless, monel, steel or plated steel. Welded. In all sizes and shapes; for operating mechanisms or as vessels. Quick delivery. BULLETIN 650.


Type AU Type AHV Type B



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FRED S. RENAULD & CO., LOS ANGELES

news (continued)

Mann Heads Armco—Atlanta

ARMCO DRAINAGE & METAL PRODUCTS, INC., ATLANTA, GEORGIA, has appointed WARREN S. MANN division manager, according to an announcement by S. R. IVES, company president. Mr. Mann succeeds HOWARD SEE, who has retired after 43 years of service with Armco.

A graduate of North Carolina State College, Mr. Mann is well known in Southeastern engineering circles. He is president of the Georgia section of the American Society of Civil Engineers, and vice president of the Society of American Military Engineers.

Westinghouse—Richmond, Ky.

The special miniature lamp department of the WESTINGHOUSE ELECTRIC CORPORATION'S Lamp Division will be moved from Bloomfield, N. J., to RICHMOND, KY. The move is expected to be completed by mid-Summer.

The special miniature lamps department manufactures radio panel and flashlight bulbs, krypton lamps which are important in mine lighting and in marking airfield approaches; projection lamps, railway and marine signal lamps and other smll-size special bulbs.

Although production of small automotive and Christmas tree lamps was recently cut-back at the Richmond plant, they will also be manufactured there when the present stock is adequately reduced.

SSIRCO Promotions—Savannah

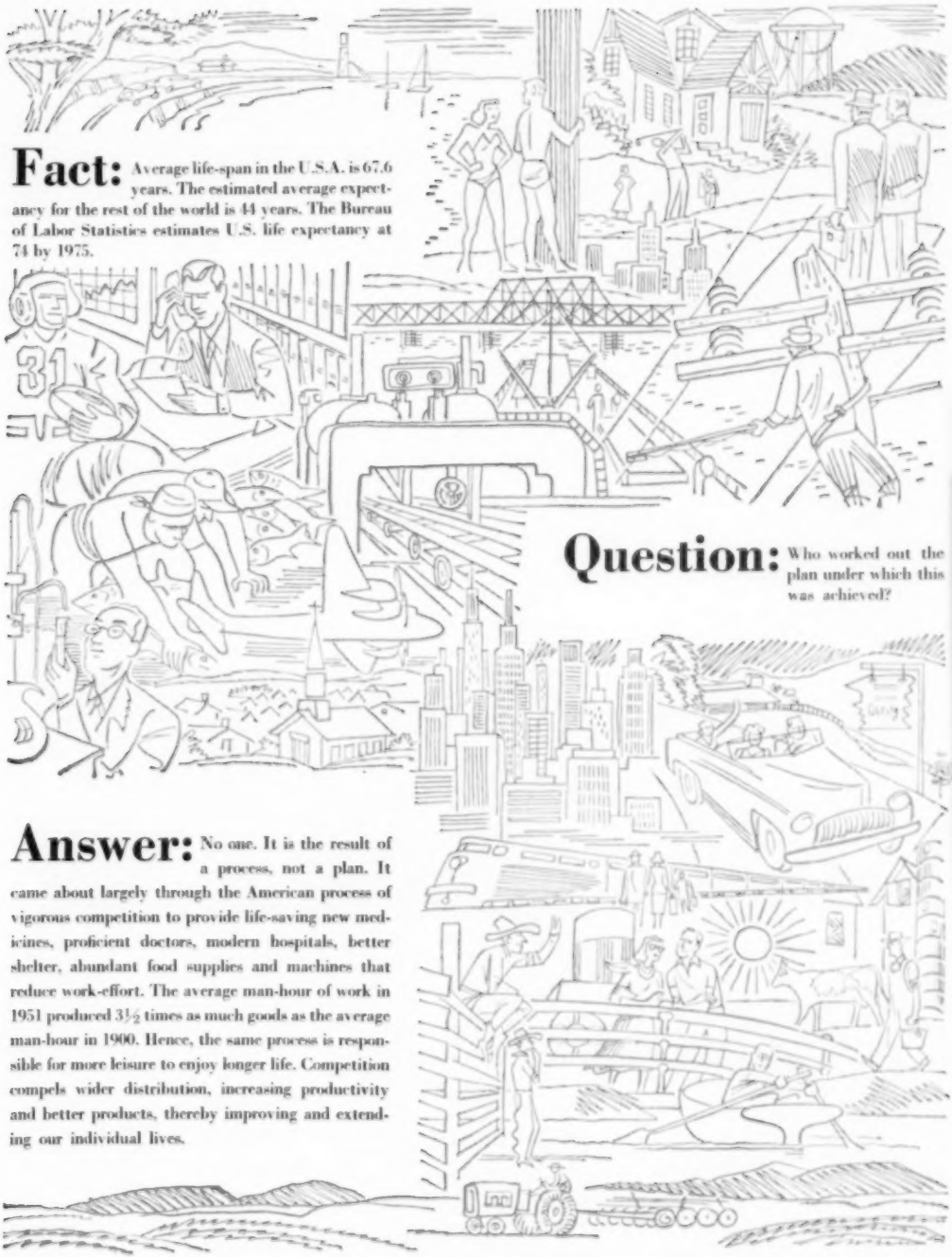
Promotions of three SOUTHERN STATES IRON ROOFING COMPANY officials has been announced by J. W. MCINTYRE, executive vice president of the company.

VICTOR L. JOHNSON has been advanced from building materials product manager to director of purchases. JULE PETRIS, office manager, replaces Johnson as product manager. FRANCIS DASHER becomes office manager.

Johnson has been with Southern States since the fall of 1950. Prior to that he was sales manager for the General Plywood Corporation.

Petris started at SSirco 14 years ago. He was made office manager of the sales department in June 1950.

Dasher joined Southern States in 1944. Later he became assistant manager of the Savannah, Ga., branch and prior to his present appointment he was assistant manager of export sales.



Fact: Average life-span in the U.S.A. is 67.6 years. The estimated average expectancy for the rest of the world is 44 years. The Bureau of Labor Statistics estimates U.S. life expectancy at 74 by 1975.

Question: Who worked out the plan under which this was achieved?

Answer: No one. It is the result of a process, not a plan. It came about largely through the American process of vigorous competition to provide life-saving new medicines, proficient doctors, modern hospitals, better shelter, abundant food supplies and machines that reduce work-effort. The average man-hour of work in 1951 produced 3½ times as much goods as the average man-hour in 1900. Hence, the same process is responsible for more leisure to enjoy longer life. Competition compels wider distribution, increasing productivity and better products, thereby improving and extending our individual lives.

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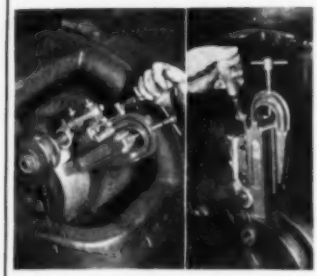
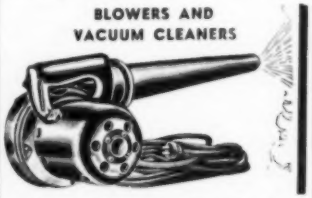
THE COMPETITIVE SYSTEM DELIVERS THE MOST TO THE GREATEST NUMBER OF PEOPLE

MARTINDALE
COMMSTONE HOLDERS



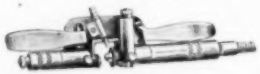
Hold Commstones rigid and true for concentric resurfacing of commutators and slip rings while running at normal speeds in their own bearings. Interchangeable boxes 1", 2" and 3" wide handle grinding jobs up to 4¼" wide.

BLOWERS AND VACUUM CLEANERS



MARTINDALE COMMSTONES AND COMMUTATOR GRINDING TOOLS

MICA UNDERCUTTERS FOR SLOTTING COMMUTATORS



Nine Motor Driven Types

MARTINDALE PROTECTIVE MASKS

PLACE HEAD BAND WELL UP AROUND HEAD TO KEEP FROM SLIPPING DOWN
PRESS NOSE TABS IN CLOSE AGAINST FACE TO HOLD PAD AGAINST THE NOSTRILS
PRESS EDGES OF FACE PLATE DOWN TO FIT FACE SNUGLY

Weigh less than ½ ounce

Write for 64-page Catalog describing these and many other products for Industrial Maintenance, Safety and Production.

MARTINDALE ELECTRIC CO.
1334 Hird Ave. Cleveland 7, Ohio

news for the South and Southwest (continued)

St. Louis Metallizing Formed

The Nooter Corporation of St. Louis, custom fabricators of steel and alloy plate processing equipment, have announced the establishment of the ST. LOUIS METALLIZING COMPANY, located at 625 S. Sarah St. Formerly the Metallizing Division of the Nooter Corporation, the newly-formed company will retain the same personnel, equipment and management.

National Radiator—N. C.

ROY I. GUILD, JR., has been named sales representative in NORTH CAROLINA for THE NATIONAL RADIATOR CO., Johnstown, Pa. Mr. Guild has been chief clerk of the company's branch sales office in RICHMOND, VA., since 1949. Continuing to report to this branch, Mr. Guild will make headquarters at 1207-D Whilden Pl., GREENSBORO, N. C.

Third UPADI Congress in New Orleans—Aug. 25-30th

The UPADI Congress, scheduled for NEW ORLEANS, August 25-30th, is the third in a series which began in 1949 in Rio de Janeiro and continued in Havana in 1951. The purpose of UPADI, the Pan-American Federation of Engineering Societies, is to provide an organization which will encompass the engineering societies of both North and South America and promote their activities on an international scale.

Representatives of engineering societies of 19 Western Hemisphere countries including the United States and Canada will convene in New Orleans for the meeting.

JAMES M. TODD, past-president of the American Society of Mechanical Engineers, and consulting mechanical engineer, is in charge of the UPADI meeting arrangements in New Orleans. Technical sessions will be held at Tulane University.

R. D. Shaw, Marshall Stirling, and *W. M. Estel* are involved in recent sales and management staff changes at *Dowell Incorporated, Tulsa, Oklahoma. R. D. Shaw* is Director of Sales; *Marshall Stirling,* General Sales Manager; and *W. M. Estel,* Assistant General Manager.

Dowell Staff Changes—Tulsa

Three important changes in the sales and management staff of DOWELL INCORPORATED have been announced by A. C. POLK, JR., General Manager of the oganization.

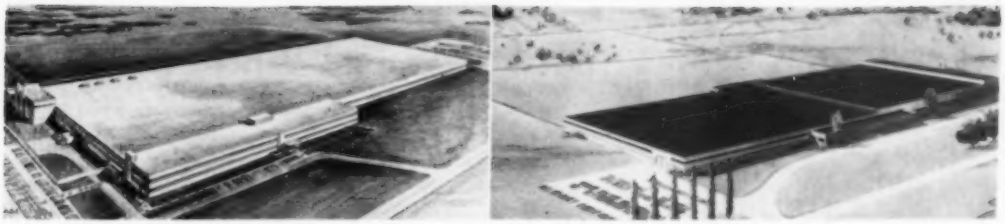
The men involved in the changes are R. D. SHAW, TULSA; MARSHALL STIRLING, FORT WORTH; and W. N. ESTEL, TULSA.

Shaw, who moved to Tulsa May 1, 1933, as General Sales Manager of Dowell, has been named Director of Sales. This Director of Sales position is a newly created post in Dowell.

Marshall Stirling, Sales Manager of the Petroleum Division of Dowell with offices in Fort Worth, will move to Tulsa as General Sales Manager replacing Shaw.

Estel, who has been Sales Development Manager, has been promoted to Assistant General Manager of Dowell and will be directly responsible for an entirely new department of employee-public relations which is now being organized.

In announcing the new setup, Polk said "these organizational changes will materially strengthen the Sales and Personnel departments, both of which are extremely important in Dowell's present expansion program."



Ground has been broken for the new Westinghouse electric meter plant at Raleigh, N. C. The 500,000 sq ft plant (shown at left) will employ about 2,500 with production scheduled for mid-1953. New plant at Vicksburg, Miss. (right) will be the largest plant in the nation devoted exclusively to the manufacture of industrial incandescent and industrial and commercial fluorescent fixtures. Production is scheduled for the fall of 1953.

Large Fabricating Plants to be Built by Westinghouse at Vicksburg, Mississippi, and Raleigh, North Carolina

WESTINGHOUSE ELECTRIC CORPORATION has announced its plans to build a multi-million dollar industrial and commercial lighting equipment plant in VICKSBURG, MISSISSIPPI, and a multi-million dollar plant to manufacture watthour electric meters at RALEIGH, NORTH CAROLINA.

The Vicksburg plant will be devoted exclusively to the manufacture of industrial incandescent and industrial and commercial fluorescent fixtures. The one story, steel and brick structure will feature the latest in industrial plant design and mechanized equipment. Both manufacturing and warehouse facilities will be provided at the 55-acre site on U. S. Route 61. Construction is scheduled for completion by the early fall of 1953.

The Raleigh plant is being constructed to provide additional facilities at the meter division's Newark, N. J., headquarters plant where watthour meters, electrical instruments, and protective electrical relays are made. On completion of the Raleigh plant, all meters will be manufactured there. The steel and concrete building, faced with brick, will feature high-level fluorescent lighting, an air conditioned cafeteria, and a medical department.

Both the Vicksburg plant and the Raleigh plant are part of the company's $296,000,000 expansion program.

Allis-Chalmers—Memphis

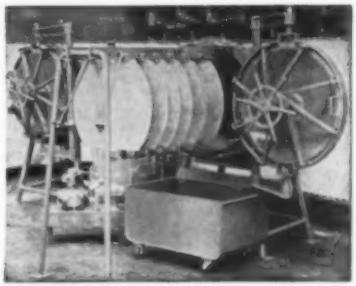
THE OATTIS ELECTRIC SUPPLY CO., INC., 240 North Front St., MEMPHIS, TENN., has been named a distributor for ALLIS-CHALMERS motors, control, pumps, transformers and Texrope drive equipment in portions of TENNESSE, MISSISSIPPI, KENTUCKY, MISSOURI and ARKANSAS.

JAMES OATTIS, JR., is president of the supply firm, which was established in April, 1952.

Garlock Retires Pattillo

GEORGE A. PATTILLO, sales representative, has been placed on retirement by THE GARLOCK PACKING COMPANY of Palmyra, New York. The announcement was made by Mr. A. C. GUSTAFSON, district manager in ST. LOUIS.

Mr. Pattillo was first employed by Garlock in GEORGIA in 1904. A few years later he was transferred to the St. Louis office and then in 1925 became a Garlock sales representative. In a sales capacity he has been representing Garlock in the State of ARKANSAS and in approximately thirty counties in the central and southern parts of OKLAHOMA. His successor is Mr. JOHN W. BOERNER who has been a Garlock representative initially in California and later in NORTH and SOUTH CAROLINA.



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1. Breaks the tightest emulsion of oil in water
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4. Saves boiler tubes

Contaminated Condensate Formerly Wasted Can Now Be Re-Used After Filtration Through the Refiner

Proved in service . . . saves heat units and fresh water . . . no backwashing . . . reduces boiler maintenance costs . . . improves boiler efficiency . . . simple and inexpensive to operate . . . requires little space.

Write for catalog. Engineering assistance gladly furnished

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Subsidiary of Condenser Service & Engr. Co., Inc.

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300 LB. Trouble Free Unions for Tough Jobs

Jefferson Unions are made of Air Furnace Malleable Iron of an average tensile strength of 55,000 p.s.i., with a yield point of 36,000 pounds and an elongation of 15% in two inches.

Our seat rings are cut from seamless drawn brass tubing, free from all casting defects—sound and uniform always.

They are accurately tapped at all times; are carefully air tested and inspected before shipment, and each and every one approved only if they meet our rigid standards of inspection.

Slightly Higher Priced
But more than worth it.

See these outstanding features—

- ★ A ground ball joint to give leak-proof service
- ★ Octagonal with square corners fits any type of wrench
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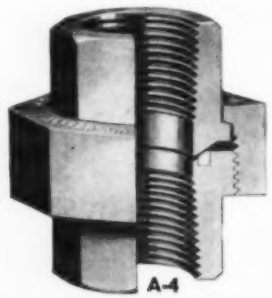
Made in all thread sizes from ¼" to 4" American Standard Taper Threads.

Also manufacture Excel 250 lbs and Master 150 lbs. All unions can be furnished with all-iron seats.



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B-10 **V-BELT DRIVES**—Catalog Section 50A, 32 pages—Simple formulas for standard quarter-turn and V-flat drives are augmented by tables of drives in all belt sections, which have been compiled for quick selection of drives of required ratio and speed. Includes engineering information on other types of V-belt drives.—FORT WORTH STEEL & MACHINERY COMPANY, P. O. Box 1038, Fort Worth, Texas.

B-11 **WATER TREATMENT**—Bulletin, 6 pages—Describes the Sola process for treating industrial and potable water. Device, functioning on a catalytic process is claimed to eliminate scale formation and corrosion in boilers, heat exchangers, and other process equipment. Discusses process, installation, operation, applications, and servicing. Ten installations most usually employed in industry are shown with assembly diagrams.—SOLA CATALYTIC COMPANY, 520 Browder St., Dallas, Texas.

B-12 **PARTS CLEANING EQUIPMENT**—Bulletin, 4 pages—Describes Turbo-Blast parts cleaning unit having 13 in. impeller, rotating at 420 rpm to create a fast-cleaning action the detergent-charged solution, thereby removing dirt, oil, sludge and grease with minimum of labor, as operator is relieved for other work while machine is in operation. Suggests applications for maintenance departments of all types of industrial operations, including four standard models for gas or fuel oil.—STORM-VULCAN, INCORPORATED, 2225 Burbank St., Dallas 19, Texas.

B-13 **PALLET LOADER**—Bulletin, 16 pages—Shows newly developed automatic pallet loader for volume package production. Photographs illustrate operation and cabinet design. Diagram shows application of pallet in production line, and recommended conveyor practice is illustrated. Includes engineering data.—LAMSON CORPORATION, Syracuse 1, N. Y.

B-14 **DRYER FURNACES**—Catalog 56, 4 pages—Illustrates and describes dryer furnaces for the coal, grain, beet sugar, chemical, lumber, salt and associated industries.—BIGELOW-LIPTAK CORP., 2550 W. Grand Blvd., Detroit 8, Mich.

B-15 **EXPANSION JOINTS**—Bulletin No. 35-51A, 28 pages—Contains information on selection, specifications, and installation of Corruflex packless expansion joints. Tables give weights and dimensions for single and double self-equalizing joints and for non-equalizing joints. Drawings are included for solving pipe expansion problems.—AMERICAN DISTRICT STEAM CO., INC., North Tonawanda, N. Y.

B-16 **DIESEL INSTRUMENTS**—Bulletin No. 4806-B, 4 pages—Describes wall and floor mounted cabinets incorporating alarm and shutdown devices to safeguard the operation of stationary diesel engines. Lists protective relays, signals, gages, and other equipment mounted on the cabinets and explains their operating sequences.—NATIONAL SUPPLY COMPANY, Engine Division, Springfield, Ohio.

B-17 **ELECTRICAL FITTINGS**—Catalog 52, 12 pages—Describes line of solderless wire connectors, cable and conduit fittings and wiring devices. Contains illustrated information on "pres-SURE-connectors" for solderless wire splicing and terminating, insulated conduit bushings, box connectors, conduit locknuts, knockout plugs, molded terminal blocks. Includes specifications, dimensional data, application instructions, and ordering information.—BUCHANAN ELECTRICAL PRODUCTS CORP., 225 Route 29, Hillside, N. J.

B-18 **INDUSTRIAL ELEVATORS**—Catalog A.I.A. 33, 16 pages—Presents line of oil-hydraulic elevators for a wide range of installations from passenger elevators to heavy duty units capable of lifting fully loaded fork trucks or motor trucks from floor to floor in factories and warehouses. Illustrated with equipment and applicational photographs.—GLOBE HOIST COMPANY, Mermaid Lane & Queen St., Philadelphia 18, Pa.

B-19 **GRAPHITIZATION**—Booklet, 12 pages—Comprehensively discusses the graphitization phenomena encountered in systems operated at elevated temperatures in the power and processing industries. Covers a ten-year research program in the company's laboratories; describes nature of graphitization and its effects, and lists preventive and corrective measures.—EDWARD VALVES, INC., Dept. GA, East Chicago, Ind.

B-20 **TRANSMISSION TOOLS**—Booklet, 12 pages—Describes and illustrates complete line of "Hydra-Matic" transmission service tools for making adjustments without removal; adjusting and repairing; disassembling and repairing; and equipment for handling the transmission.—KENT-MOORE ORGANIZATION, INC., 5-105 G. M. Bldg., Detroit 2, Mich.

B-21 **TURBINE VANE PUMPS**—Bulletin No. B-2205, 12 pages—Illustrates and describes complete line of self-priming and standard design turbine vane type pumps for pumping hot and cold, clear and vaporous liquid, in moderate capacities, against medium or high heads.—PEERLESS PUMP DIVISION, FOOD MACHINERY & CHEMICAL CORP., 301 West Avenue 26, Los Angeles 31, Calif.

B-22 **SAFETY EQUIPMENT**—Bulletin No. 30, 6 pages—Illustrates and describes emergency showers for use wherever fire, acids, caustics, bacteriological, radiological or biological materials are a threat to the human body. Covers applications in industrial plants.—LOGAN EMERGENCY SHOWERS, INC., P. O. Box 111, Glendale, California.

B-23 **REGULATING VALVES**—Bulletin 513, 4 pages—Describes the new "Class DV" double seated diaphragm regulating valves including design, construction, application for use with control instruments, and operation. Illustrated.—LESLIE CO., 369 Delafield Ave., Lyndhurst, N. J.

B-24 **STEAM GENERATOR**—Bulletin No. 2000, 28 pages—Describes distinctive design and engineering features of the self-contained Preferred Unit Steam Generator, with illustrations of the components and the unit including cutaway views for easy visual reference.—PREFERRED UTILITIES MANUFACTURING CORP., 1860 Broadway, New York 23, N. Y.

B-25 **BELT GRINDING ATTACHMENT**—Bulletin S-13-15M552, 4 pages—Describes attachments combining maneuverability of portable grinder and utility

of the abrasive belt. Illustrated with equipment and applicational photographs. Includes table of specifications.—BUCKEYE TOOLS CORP., Div. 52, P. O. Box 966, Dayton 1, Ohio.

B-26 **ELECTRICAL CONTACTS**—Catalog C-520, 12 pages—Prepared to aid in selection and use of Gibson electrical contacts, including alarms, bells and buzzers, contactors, instruments, rheostats, thermostats, and other applications. Also describes the company's assembly service contact engineering service.—GIBSON ELECTRIC CO., 8331 Frankstown Ave., Pittsburgh 21, Pa.

B-27 **PRESSURE GAUGES** — Specification Sheet 719, 4 pages—Describes the company's indicating and recording pressure gauges with pneumatic control, including construction and engineering details, specifications, dimensions, and ordering information.—MINNEAPOLIS-HONEYWELL REGULATOR Co., Industrial Division, Wayne & Windrim Aves., Philadelphia 44, Pa.

B-28 **MATERIALS HANDLING**—Bulletin 80, 4 pages—Describes the company's newly developed Krane Kar Trailer Transport, a mobile crane integrally linked with a trailer, for lifting, stacking, spotting and loading applications; and for carrying bulky, heavy, or large quantities of varied materials in yard or shops.—SILENT HOIST & CRANE Co., INC., 841-877 Sixty-third St., Brooklyn 20, N. Y.

B-29 **VIBRATION CONTROL** — Bulletin ER-702, 4 pages—Describes "Elasto-Rib" isolation pad material, which controls transmission of virbration and noise without bolting to the floor for most machinery and equipment applications. Gives loading limits and shows five typical installations.—THE KORFUND CO., 48-48G 32nd Place, Long Island City 1, N. Y.

B-30 **PROTECTIVE COATINGS** — Catalog, 44 pages—Describes base protective coatings, their properties, their uses and tests to which they have been subjected. Related products such as caulking compounds, primers and membraning material to augment the use of the company's coating, are included. — INSULMASTIC CORPORATION OF AMERICA, 1141 Oliver Bldg., Pittsburgh 22, Pa.

Books for the Plant Engineer

Heat Exchanger Standards

PUBLISHED BY TEMA
53 Park Place, New York 7, N. Y.
162 pages
Price, $5.50

The Third Edition of "Standards of Tubular Exchanger Manufacturers Association," comprises a revision of the 1949 edition, with additions to the mechanical and thermal standards,to conform with current findings and conclusions of the TEMA Technical Committee, and two entirely new sections. One gives the mechanical standards for alloy steel heat exchangers and the other contains general information valuable to designers, fabricators, and users of heat exchangers.

In order to make the 1952 Standards a single, completely self-contained reference source, a General Information section has been added. The section brings together in one volume with the TEMA Standards, not only other helpful data formerly obtainable only from scattered sources, but tables just recently made available on maximum allowable stress values of carbon, low and high alloy steels, nickel and high nickel alloys, copper and copper alloys, carbon and low alloy steel pipe and tubes.

Preventive Maintenance for Gas and Diesel Engines

PUBLISHED BY THE COOPER-BESSEMER CORP.
Mount Vernon, Ohio
Price, $2.00

A practical maintenance program to insure continuous and efficient operation of gas and diesel engines is detailed in two new manuals. One manual covers Gas-Diesel and Diesel engines; a second manual covers gas engines. In contrast to the usual periodic 8,000-hour overall check or the progressive-type maintenance schedule, these manuals show how to perform continuing checks on engines while in service to accurately forecast internal conditions of the engines and anticipate operational needs.

The Science of Flames and Furnaces

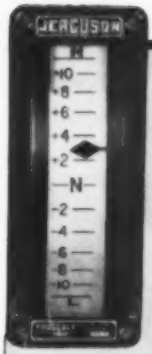
BY M. W. THRING
PUBLISHED BY JOHN WILEY & SONS, INC.
440 Fourth Ave., New York 16, N. Y.
416 pages
Price, $6.50

"The Science of Flames and Furnaces" discusses the Function of a Furnace; The Thermodynamics of Furnace Heating; The Liberation of Heat by Combustion; Heat Transfer; The Aerodynamics of Hot Systems; The Science of Furnace Construction; and The Application of the Scientific Method of Furnaces. Each chapter is summarized, and a table of conversion factors is included.

Practical Metallurgy for Engineers

PUBLISHED BY E. F. HOUGHTON & CO.
303 W. Lehigh Ave., Philadelphia 33, Pa.
599 pages
Price, $3.50

This fifth edition of "Practical Metallurgy for Engineers" represents more than a year's work of revision and checking to bring the previous edition up to date. It presents the



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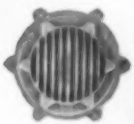
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latest standards and practices followed in the metal industry, and includes a discussion of future probabilities relating to new metals, new alloying elements and new types of heat treatment. Comprehensive sections cover heat treating.

New chapters include one on flame and induction heating to bring in new developments which have expanded the useful range of both methods. Following the chapter on carburizing, is a new chapter on "Other Surface Hardening Methods." The chapter on "Heat Treatment of Aluminum Alloys" has been expanded to include magnesium and copper alloys as well as aluminum alloys. Other revisions incorporate the latest methods and data related to all phases of metallurgy, including the latest AISI steel classifications.

Thermal Fatigue and Thermal Shock

BY HELMUT THIELSCH

PUBLISHED BY AMERICAN WELDING SOCIETY
33 W. 39th St., New York 18, N. Y.
Bulletin No. 10, 24 pages
Price, $1.00

"Thermal Fatigue and Thermal Shock" discusses the continuous improvement and development of many types of process equipment and installations which, completely or partially, are exposed at elevated temperatures and have resulted in an ever-increasing demand for engineering materials which can provide satisfactory service under increasingly severe conditions of temperature and pressure.

Among the subjects covered are the characteristics of thermal fatigue and shock, effects of stresses, design, structure, carbon migration, intergranular

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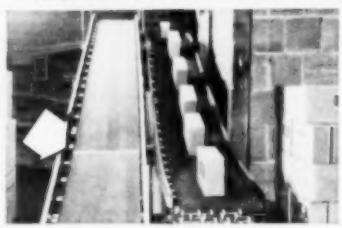

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Air mixed with the steam in your heaters or coils is expensive because it retards heat transfer and lowers steam temperature. Remove air from steam heated machines with ***Sarco thermostatic air vents.*** Write for Bulletin 276 and the name of the Sarco man nearest you. He can help you select the best vent for your purpose and the right place to install it.

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Southwestern Division: 2512 So. Blvd., Houston 6, Tex.

oxidation, phase transformations and welding; thermal fatigue and shock in similar and dissimilar metal joints. Examples of thermal fatigue and shock failures in various service applications (refinery installations, power plants, and others) are given and discussed. The more important testing procedures used to evaluate thermal fatigue and shock are also described.

S.A.S.I. Meets in Winston-Salem, N. C.

(*Starts on page* 66)

ing. The heat generating auxiliary equipment on this reactor cost about $42,000 and makes possible a saving in operating costs of about $7,000 per year.

In the United States, reactor development is being carried on at Arco, Idaho, where the AEC recently placed in operation a 100 kilowatt electrical generator, and at Raleigh, North Carolina, where a reactor is being completed on the campus of North Carolina State College. Dr. Beck conceived the idea of building the Raleigh reactor, supervised its design, and now is director of the research program there.

Association Awards

The Association bestowed its highest honors on a Tennessee industrialist and a North Carolina scientist.

Recipient of the S.A.S.I. award for distinguished service to Southern industry was Col. E. W. Palmer, President of the Kingsport Press, the largest book manufacturing plant in the world. Col. Palmer has been allied for a quarter of a century with many national, state, and local activities of economic and social significance. The S.A.S.I. citation commended him particularly for his work as chairman of the National Planning Association's Committee of the South.

Recipient of the S.A.S.I. award for distinguished service to the South in the scientific field was Dr. Paul M. Gross, Vice President of Duke University and President of the Oak Ridge Institute of Nuclear Studies. He has been prominent in scientific affairs nationally for many years.

Piping Insulation For Air Conditioning System

(*Starts on page* 70)

putty or chlorinated wax compounds. This is not necessary if the insulation material is highly moisture resistant and joints properly sealed.

When factory wrapped insulation covered with a glass cloth membrane is used either outdoors or indoors, it is not necessary to give it any other finish. The regular pipe insulation, which does not have the glass cloth membrane cover does not need a finish when located indoors, unless it is desired to strengthen it against possible abrasion or to improve its appearance. One or two coats of good oil paint is sufficient. When outdoors, the insulation should be protected with one or two coats of an asphalt base aluminum paint. The finish for valves and fitting insulation should always be the same as that applied to the adjacent piping.

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creates the first impression in the mind of the buyer—the impression of prestige and quality which frequently requires years of service and salesmanship to build.

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(Established 1897)

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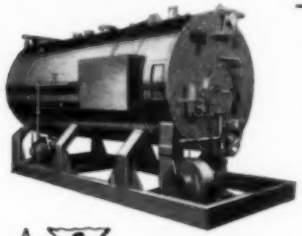

10 - 500 h.p.
15# - 200# w.p.

★

OIL . . . GAS
or
OIL - GAS
Combinations

★

FUEL — 80% Guaranteed Efficiency

LABOR — Minimum Attention Required

WATCH FOR ME NEXT MONTH . . . MEANWHILE WRITE FOR BULLETIN 1050

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Builders of Better Boilers since 1848

Manufactured under License in Canada by VOLCANO, Ltd., Montreal, P. Q.

Eliminate Air
In Gas Lines With

NORWALK DIAPHRAGM TYPE CHECK VALVE

Vertical Type in Sizes 3/8" thru 6"
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Norwalk Diaphragm Type Check Valves both Vertical and Horizontal, provide positive check against reverse flow of either gas or air. Rugged construction will stand back pressures to 50 lbs. Soft seat disc will seat freely when gas flows in desired direction or will seat tightly on equalized or back pressure. Valves for higher pressures supplied on special order.

NORWALK VALVE COMPANY
South Norwalk, Conn.

For Intermediate and High Pressure Gas

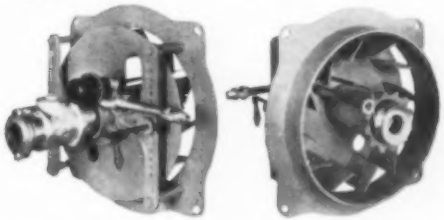
WEBSTER RECTILINEAR* Gas Burner

Now available after almost three years of operating tests and installations having capacity of 1,242,000,000 Btu/hr. at 10 psig.

This unique application of the *Venturi* principle has resulted in a high input burner that can be installed through *very* narrow rectangular furnace openings.

It is recommended for inter-tube firing; firing in a horizontal plane through small openings over coal grates; firing in a vertical plane on either side or on a horizontal plane over a stoker or oil burner; and also for use in all types drying kilns.

It is small in size, and light in weight, with excellent turn-down without flash back; stable flame retention even at high inputs—low noise level.



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High Pressure Rubber Gaskets

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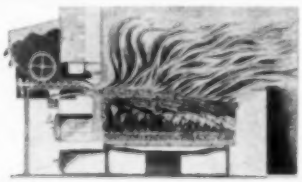
REG. U.S. PAT. OFF.

INCOMPARABLE ALL SOLID FUELS "Air-Spray-Spred" STOKER
BURNS COAL AND/OR WOOD WASTES



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FYR-FEEDER *quickly pays for itself*

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for Jacket Water and Lube Oil

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Compressed Air or Water Operated

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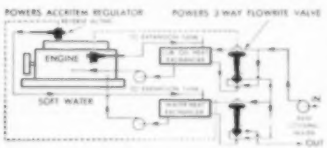

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(a621)

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60 YEARS OF WATER TEMPERATURE CONTROL

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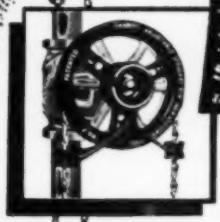
—Adjustable—
SPROCKET RIM
with Chain Guide



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● Prevents accidents, prevents waste, provides efficient control, and saves money. A range of 10 ADJUSTABLE sizes fits all valve wheels, with rising or non-rising stems, from 2 to 30 inches in diameter.

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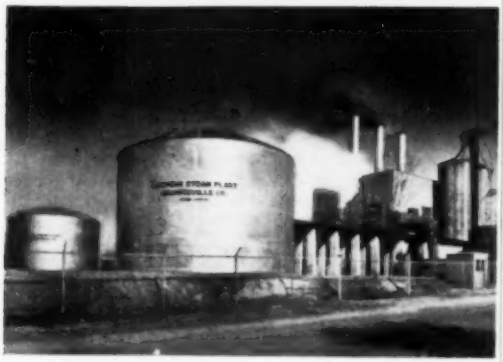
NEW BEDFORD, MASSACHUSETTS



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VERTICAL BOILERS
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STEEL SMOKESTACKS • SMOKE BREECHINGS • AIR COMPRESSOR TANKS
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VOLTROL VANE CONTROL MECHANISM

LEVER FOR CAPACITY REGULATION (Suitable for attachment to Combustion Controller)

VOLTROL (Volume Control) VANES giving Capacity Regulation down to 10% of Max

AIR STRAIGHTENING VANES

FULLY ENCLOSED DUST-PROOF MOTOR

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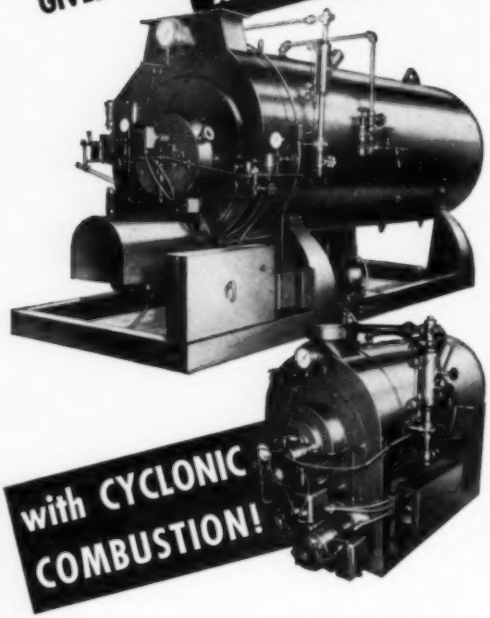
Wing

AXIAL FLOW FORCED DRAFT BLOWERS

REGARDLESS OF SIZE...

CYCLOTHERM GIVES YOU STEAM AS YOU NEED IT



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Boilers are designed for oil or gas operations from 18 thru 500 h.p., 15 to 200 lbs. operating pressure.

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DIVISION UNITED STATES RADIATOR CORP
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They REPEAT-ORDER
HOFFMAN *Heavy-Duty*
VACUUM CLEANING EQUIPMENT for Wider Range Dust Removal!

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Provides cleaning in several areas at the same time. Sweepers attach cleaning hose to conveniently located inlets (in a permanently piped system). Dust is removed pneumatically to central collectors for easy disposal.

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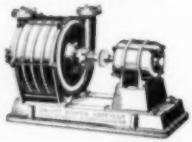

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all-round, money-saving purchasing service

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WE SECURE PRIORITIES.
If your order needs a priority rating, we automatically follow through.

WE ESTABLISH AND KEEP RECORDS,
including all original cost accounting, continuing property records, valuation work, cost data, and inventory. Your organization is relieved of paper work and the expense of extra personnel.

WE HANDLE FOREIGN SHIPMENTS.
We negotiate directly with the various Shipping Conferences, employ interpreters, maintain contact with foreign government agencies in this country, act as a clearing house.

WE TEST FOR QUALITY.
Our buyers, because of their daily volume purchases, are truly expert buyers. They have a vast knowledge of markets and suppliers. They are aided in their efforts to secure the best by Gilbert's own Testing Laboratory.

WE ANALYZE BIDS.
Our specialists are fully experienced in appraising bids. Gilbert's engineering division aids the Purchasing Department in analyzing engineering bids.

IN OTHER WORDS, Gilbert offers a *complete* Purchasing Service—one designed to save your company time, trouble, and money. We shall be glad to have one of our representatives explain our service more fully. No obligation, of course! Simply write: Purchasing Department, Gilbert Associates, Inc., 412 Washington St., Reading, Pa.

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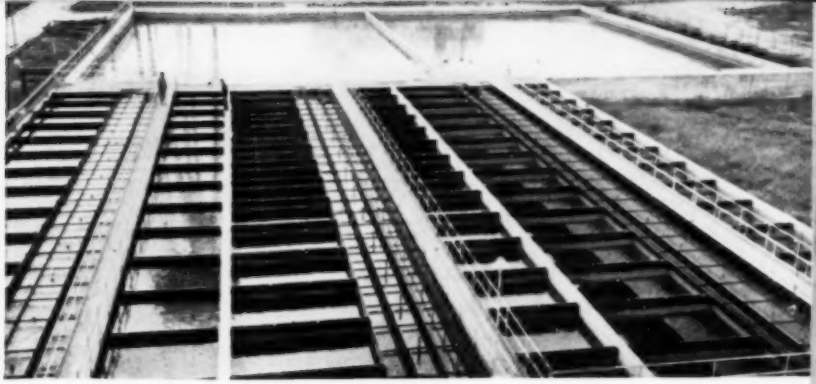
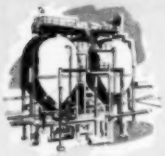


Three Permutit Precipitators at Alcoa's Davenport, Iowa plant. Each processes 3,000,000 gallons of water a day.

How Permutit helps Alcoa get BETTER WATER...

THESE BASIC PROCESSES, PLUS PERMUTIT SKILL, CAN SOLVE YOUR WATER CONDITIONING PROBLEMS



1. SLUDGE BLANKET HOT LIME SODA. Application of the sludge blanket to hot lime soda treatment reduces silica in boiler feed make-up, produces high quality steam.

2. HOT ZEOLITE—PERMUTIT Q. Subsequent treatment of water from hot lime soda treatment yields effluent of zero hardness. Permutit Q, or styrene base mineral resistant to high temperatures, replaces second stage phosphate treatment.

3. SILICA REMOVAL PLUS DEMINERALIZATION. Demineralization by cold ion exchange processes produces water comparable to distilled water only at a fraction of the cost of distillation. Treatment by anion exchange resin, Permutit S, reduces silica to less than 0.2 ppm.

4. DEAERATING HEATER. The Permutit Deaerating Heater, utilizing exhaust or bled steam, prevents corrosion of feed lines, stage heaters, economizers, and boilers, by removing oxygen and free CO_2. Capacities from 12,000 to 1,400,000 pounds per hour are in service.

5. PRECIPITATOR. The Permutit Precipitator is used to lower alkalinity, reduce hardness, and help to remove turbidity, color, taste and odor. It can also be used to reduce silica.

with
LOW TURBIDITY
LOW OPERATING COST
LOW CHEMICAL COST
LOW WATER WASTE

Alcoa's water needs average 9,000,000 gallons per day in their Davenport, Iowa plant. A Permutit Precipitator processes all their mill use water, and yields an effluent turbidity of only 5 ppm from an influent turbidity as high as 900 ppm. Yet operating cost, including pumping, chemicals, depreciation and maintenance, is only 5¢ per thousand gallons. Of this, chemical cost is less than 2¢ per thousand. Water waste has averaged only 8.75%.

Precipitators for lowering alkalinity and removing turbidity of water are only one of many Permutit products for solving water conditioning problems. In the column at left, some of the more important basic processes are illustrated and described.

Find out how Permutit can solve *your* water processing problems. Write to The Permutit Company, Dept. SI-8, 330 West 42nd Street, New York 36, N. Y., or to Permutit Company of Canada, Ltd., 6975 Jeanne Mance St., Montreal.

PERMUTIT

WATER CONDITIONING HEADQUARTERS FOR OVER 40 YEARS